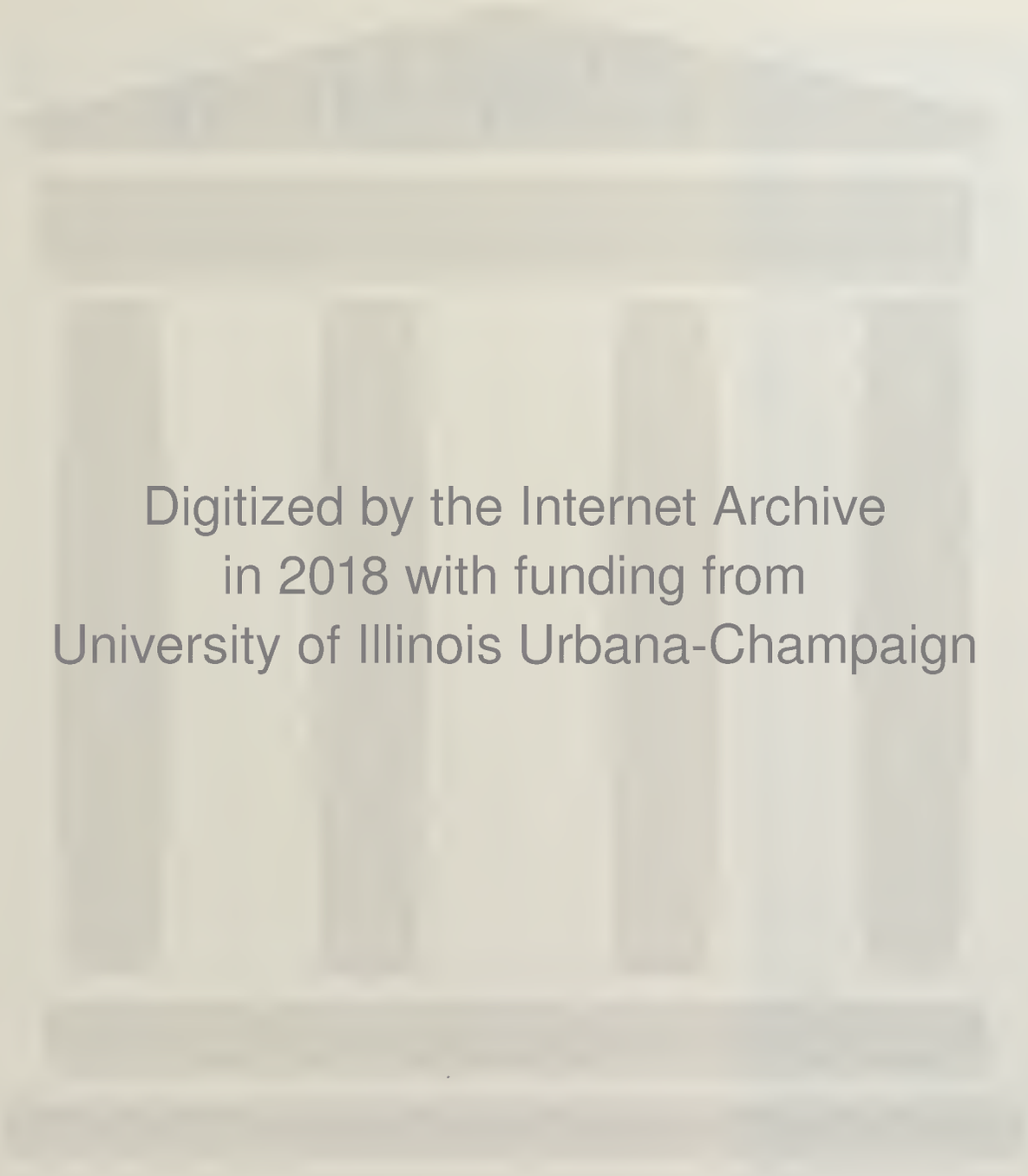

BULLETIN 725

SOILS OF ILLINOIS

University of Illinois College of Agriculture Agricultural Experiment Station
in Cooperation With the Soil Conservation Service, U.S. Department of Agriculture

CONTENTS

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The authors are indebted to other pedology staff members and Soil Conservation Service scientists for help in many studies leading to this publication.

COVER: The cover photograph is a soil profile of Beecher silt loam, which is found in the transitional zone between the prairie and forest types of soils. The nature of a soil profile is important in soil classification, and it influences the rooting patterns and growth of crops.

Urbana, Illinois August, 1967

Publications in the bulletin series report the results of investigations made or sponsored by the Experiment Station

Soils of Illinois

Illinois soils vary in properties and producing capacities. Large areas of the state have soils that are among the most productive in the world. On the other hand, some areas have soils that are not productive for the common cultivated field crops because these soils are too steep or drouthy, or have some other undesirable features. Often these less productive soils can be used to advantage for pasture, forage, forest production, or for hunting or other recreational purposes. Many of the present problems with soils are the result of improper use and management. The solution to some of these problems lies in wiser planning so that the uses made of the soils are better fitted to their characteristics and qualities.

To make best use of the soils of Illinois it is necessary, among other things, to know and understand the nature and properties of the soils, how they occur, and where they occur in the state. This publication is concerned with these factors about Illinois soils. It deals with the general nature, occurrence, and distribution of the various soil associations in the state. The soil map in this bulletin shows the location and extent of the soil associations and the text gives general properties, problems, uses, and crop responses to soil treatment of the various soils within these associations.

This publication is intended for those interested in a broad picture of the soil resources and soil conditions in the state. It can be used in a general way for locating land having certain desired qualities for various agricultural, urban, industrial, and engineering purposes. It can be used for broad land-use planning and zoning. Any number of individuals, such as farmers and farm managers, foresters, engineers, investors, land appraisers, zoning and planning commissioners, real estate dealers, subdividers, and home builders can use this information for their various needs. However, it should always be kept in mind that for many specific purposes, more detailed information, such as that given in county soil reports or gained from on-site studies, is needed after a general area has been studied and selected. See page 43 for a list of available county soil reports.

Information on interpretation of Illinois soils for various purposes, such as drainage, irrigation, engineering, urbanization, septic tanks, recreation, woodland, and wildlife, as well as for agriculture, is also available in a number of publications. Drainage and irrigation guides for Illinois are available through the Agricultural Engineering Department, University of Illinois. Information on engineering, urbanization, septic tanks, recreation, woodland, and wildlife interpretations for Illinois soils is available through the Soil Conservation Service district offices and county extension adviser offices.

Soils are classified and mapped on the basis of a number of properties, such as the kind, thickness, and arrangement of horizons or layers, as well as such properties as the color, texture, structure, reaction, consistence, and mineralogical and chemical composition of these horizons. Features such as slope, stoniness, degree of erosion, permeability, and total thickness of profile are also important in determining use and crop adaption of soils. It should be kept in mind that any soil bearing a name such as Muscatine, Flanagan, Elliott, or Cisne has a range in such properties and that the boundaries between different kinds of soils in the field may or may not be sharp. Soils tend to form a continuum on the earth's surface, and usually in the local landscape one soil grades gradually to others. The boundaries or the limits in the range of one kind of soil are placed by definition of that soil. In other words, a particular kind of soil does not have boundaries as clear as an individual plant or animal. Nevertheless, in order to remember significant characteristics of soils, in order to organize our knowledge of them and show relationships between various soils and between the soils and their environment, and to make predictions of their response and behavior under various uses and management systems, we need to define and classify soils on the basis of their properties.

Soil Associations of Illinois

The soil associations shown on the general soil map of Illinois in this bulletin are composed of several related soil series or kinds of soils developed from similar parent material and having similar surface soil color. The degree of development may vary somewhat among individual soils and the soils also differ in properties related to the internal drainage or degree of wetness during their development. The soils in an association tend to occur in a characteristic pattern in the landscape that is often repeated over and over. However, the proportion of the various soils changes from place to place, depending largely on slope and natural drainage conditions.

Table 1. — Soil Series in Illinois[1] Grouped by Association Area on General Soil Map of Illinois, According to Parent Material, Surface Color, Degree of Profile Development, and Natural Drainage Class

Area on general soil map	Parent material[2]	Surface color[2]	Degree of development[2]	Natural internal drainage class				Associated soil type numbers[4]
				Well	Moderately well	Imperfect[3]	Poor	
A	Loess >4-5 ft. thick, noncalc. >3½ ft.	Dark	Weak	Port Byron 277	Joy 275			272, 276, 562, 564
		Dark	Moderate	——Tama 36——		Muscatine 41	Sable 68	34, 44, 45, 47, 67, 244, 272, 660
		Dark	Mod.-mod. strong		Bolivia 246	Ipava 43	Sable 68	34, 44, 45, 47, 67, 244, 249, 470
B	Loess 3-5 ft. thick on calc. loam-sicl. till	Dark	Mod.-mod. strong	——Catlin 171——		Flanagan 154	Drummer 152	67, 153, 330
	Loess 1-3 ft. thick on cl. till, noncalc. >3½ ft.	Dark	Moderate	Sidell 55	Dana 56	Raub 481	Drummer 152	330
C	Loess 3-5 ft. thick on calc. sic.-c. till or drift	Dark	Mod. strong		Wenona 388	Rutland 375	Streator 435	91, 235, 330
D	Loess 5-7 ft. thick on weathered Illinoian till	Dark	Mod. strong	Douglas 128	Harrison 127	Herrick 46	Virden 47, 50	138, 250, 251, 252, 256, 259, 474
E	Loess 4-6 ft. thick on weathered Illinoian till	Mod. dark	Strong		O'Fallon 114	Oconee 113	Cowden 112	48, 120, 138, 250, 474, 581, 584
F	Loess 2½-4 ft. thick on weathered Illinoian till	Mod. dark	Strong-very strong		Richview 4	Hoyleton 3	Cisne 2	48, 120, 167, 218, 287, 581, 584
G	Med. tex. mat. 2-3½ ft. thick on calc. gravel	Dark	Moderate	Warsaw 290		Kane 343	Will 329	93, 197, 313, 318
	Med. tex. mat. 2-3½ ft. thick on noncalc. gravel	Dark	Mod.-weak	Carmi 285, 286		Omaha 289	Ahington 300	79, 155, 305, 253
H	Loess 2½-5 ft. thick on noncalc. cl.-scl. till	Dark	Moderate	Ogle 412				
	Loess 1½-3 ft. thick on noncalc. cl.-scl. till to 4 ft.	Dark	Moderate	Durand 416				
	Loess 1-3 ft. thick on sl. till, calc. <4 ft.	Dark	Moderate	——Ringwood 297——				191, 197
	Loess <1 ft. thick on sl. till, calc. <3½ ft.	Dark	Moderate	Griswold 363				
I	Loess 1½-3 ft. thick on loam till, calc. by 2-3½ ft.	Dark	Moderate	——Sayhrook 145——		Lishon 59		152
	Loess <1½ ft. thick on loam till, calc. by 2-3½ ft.	Dark	Moderate	LaRose 60, Parr 221	Corwin 495	Odell 490	Pella 153	152, 204
J	Med. tex. mat. 2-4 ft. thick on calc. sicl. till	Dark	Moderate	——Symerton 294——		Andres 293	Reddick 594	97, 100, 103, 210
	Med. tex. mat. <2 ft. thick on sicl. till, calc. at 1½-3 ft.	Dark	Moderate	——Varna 223——		Elliott 146	Ashkum 232	330
	Sandy mat. 1½-3½ ft. thick on sicl., calc. by <3½ ft.	Dark	Mod.-weak	——Rankin 157——		Wesley 141		
K	Med. tex. mat. 2-4 ft. thick on calc. sic. drift	Dark	Moderate	——Mona 448——		Mokena 295		
	Med. tex. mat. (inc. loess) <2 ft. thick on sic. drift, calc. at <3 ft.	Dark	Mod. strong			Swygert 91	Bryce 235	42, 229, 238
	Med. tex. mat. (inc. loess) <2 ft. thick on c. drift, calc. at <3 ft.	Dark	Mod.-strong			Clarence 147	Rowe 230	42, 229
L	Loess >5 ft. thick, calc. at 2½-4 ft.	Light	Moderate	Sylvan 19	Iona 307	Reesville 723	Whitson 116	30, 35, 271
	Loess >4-5 ft. thick, noncalc. >3½ ft. (Same as A above.)	Mod. dark	Weak	Mt. Carroll 268	Fall 263			
		Light	Weak	Seaton 274	Decorra 273			30, 271, 281, 282, 563, 565
		Mod. dark	Moderate	——Downs 386——		Atterberry 61		
		Light	Moderate	Fayette 280	Rozetta 279	Stronghurst 278	Traer 633	30, 35, 271
M	Loess 3-5 ft. thick on calc. loam-sicl. till (Same as B above.)	Mod. dark	Mod. strong			Sunbury 234		
		Light	Mod. strong	——Birkheck 233——		Sabina 236	Ward 207	
	Loess 1-3 ft. thick on cl. till, noncalc. >3½ ft. (Same as B above.)	Mod. dark	Moderate	Mellott 497	Wingate 348	Toronto 353		
		Light	Moderate	Russell 322	Xenia 291	Fincastle 496		
N	Loess >4-5 ft. thick, noncalc. >3 ft. (Same as A above.)	Mod. dark	Mod. strong	——Sicily 258——		Clarksdale 257		
		Light	Mod. strong	Clary 283	Clinton 18	Keomah 17	Rushville 16	6, 7, 8, 119, 264, 470, 660

[1] Correlated and important uncorrelated soils in Illinois.

[2] Abbreviations and symbols used in tables are as follows: <=less than; >=greater than; c=clay; calc.=calcareous; cl.=clay loam; f.=fine; fs.=fine sand; fsl.=fine sandy loam; ft.=feet; g.=gravel; gcl.=gravelly clay loam; gl.=gravelly loam; hv.=heavy; inc.=including; l.=loam; lfs.=loamy fine sand; ls.=loamy sand; mat.=material; med.=medium; mod.=moderate; noncalc.=noncalcareous; s.=sand; scl.=sandy clay loam; si.=silt; sic.=silty clay; sicl.=silty clay loam; sil.=silt loam; sl.=sandy loam; slt.=slightly; and tex.=texture.

[3] "Somewhat poor" may also be used for this soil drainage class.

[4] Associated soils often occur in the field with those soils shown on the same lines, but usually differ in one or more characteristics. Some soils shown in a given area are also listed as associated soils in other areas. Names of associated soils are given in the indexes on pages 44 and 46, which also indicate where the characteristics of the various soils are discussed.

Table 1. — Continued

Area on general soil map	Parent material[2]	Surface color[2]	Degree of development[2]	Natural internal drainage class				Associated soil type numbers
				Well	Moderately well	Imperfect[3]	Poor	
O	Loess >5 ft. tbick, calc. at 2½-4 ft.	Ligbt	Moderate	Sylvan 19	Iona 307	Reesville 723	Whitson 116	30, 35, 271
	Loess >5 ft. thick, noncalc. >3½ ft.	Ligbt	Moderate	Alford 308	Muren 453	Iva 454		35, 216, 271
P	Loess 4-10 ft. thick on Illinoian drift or >7 ft. thick on residuum	Light	Strong		Hosmer 214	Stoy 164	Weir 165	8, 15, 215, 583, 585
Q	Loess 1½-4 ft. tbick on Illinoian drift	Ligbt	Strong-very strong		Ava 14	Bluford 13	Wynoose 12	15, 109, 337, 583, 585
	Loess <1½ ft. tbick on Illinoian drift	Ligbt	Mod.-strong	——Hickory 8——		Blair 5		264
R	Loess 3½-7 ft. tbick on bedrock residuum	Ligbt	Strong-very strong		Grantsburg 301	Robbs 335		
	Loess 1½-3½ ft. thick on bedrock residuum	Ligbt	Mod.-strong	——Zanesville 340——				339, 425
S	Med. tex. mat. 2-3½ ft. tbick on calc. gravel	Ligbt	Moderate	Fox 327		Homer 326		93, 253, 313, 323, 325, 342, 364
T	Loess 2½-5 ft. thick on noncalc. cl.-scl. till (Same as H above.)	Mod. dark	Moderate	Myrtle 414				
		Light	Moderate	Flagg 419				
	Loess 1½-3 ft. thick on noncalc. cl.-scl. till to 4 ft. (Same as H above.)	Mod. dark	Moderate	——Argyle 227——		Beaver 225		
		Ligbt	Moderate	——Pecatonica 21——				
	Loess 1-3 ft. on sl. till, calc. <4 ft. (Same as H above.)	Light	Moderate	——McHenry 310——				292, 296, 299, 364
	Loess <1 ft. tbick on sl. till, calc. <3½ ft. (Same as H above.)	Light	Moderate	Lapeer 361				25, 292, 296, 364
	Loess <1½ ft. thick on noncalc. cl.-scl. till to 3½ ft.	Light	Moderate	Westville 22				25
U	Loess 1½-3 ft. thick on loam till, calc. by 2-3½ ft. (Same as I above.)	Mod. dark	Moderate			Herbert 62		
		Light	Moderate	Dodge 24				
	Loess <1½ ft. thick on loam till, calc. by 2-3½ ft. (Same as I above.)	Mod. dark	Moderate	Octagon 656	Montmorenci 57	Otterbein 617		
		Light	Moderate	Miami 27	Celina 616			25, 205, 224
V	Med. tex. mat. <2 ft. thick on sicl. till, calc. at 1½-3 ft. (Same as J above.)	Mod. dark	Moderate	——Markham 531——		Beecber 298		210, 324
		Light	Moderate	——Morley 194——		Blount 23		
	Med. tex. mat. <2 ft. thick on sic.-c. drift, calc. at 1½-3 ft.	Mod. dark	Mod. strong			Frankfort 320		
		Light	Mod.-strong		St. Clair 560	Eylar 228 (Nappanee)		241
W	Loess 3-5 ft. tbick on noncalc. med. tex. outwasb or sl. till to 5 ft.	Dark	Moderate	——Plano 199——		Elburn 198	Drummer 152	191, 197, 206
		Mod. dark	Moderate	——Batavia 105——		Virgil 104		
		Light	Moderate	——St. Charles 243——		Kendall 242		
	Loess <3 ft. tbick on med. tex. outwasb to 5 ft., noncalc. to 3½ ft.	Dark	Moderate	Alexis 80	Proctor 148	Brenton 149		67, 136, 152, 206,
		Mod. dark	Moderate	——Harvard 344——		Millbrook 219		346
		Light	Moderate	——Camden 134——		Starks 132	Sexton 208	137
	Silty wasb >5 ft. tbick	Dark	Weak	——Worthen 37——		Littleton 81		39
		Light	Weak	——Drury 75——				732
	Silty mat. >4 ft. thick, calc. at 2-3½ ft.	Dark	Moderate			Harco 484		
		Mod. dark	Moderate			Marissa 176	Patton 142	
		Light	Moderate	——Uniontown 482——		Reesville 723		

[1] Correlated and important uncorrelated soils in Illinois.

[2] Abbreviations and symbols used in tables are as follows: <=less than; >=greater than; c=clay; calc.=calcareous; cl.=clay loam; f.=fine; fs.=fine sand; fsl.=fine sandy loam; ft.=feet; g.=gravel; gcl.=gravelly clay loam; gl.=gravelly loam; bv.=heavy; inc.=including; l.=loam; lfs.=loamy fine sand; ls.=loamy sand; mat.=material; med.=medium; mod.=moderate; noncalc.=noncalcareous; s.=sandy; scl.=sandy clay loam; si.=silt; sic.=silty clay; sicl.=silty clay loam; sil.=silt loam; sl.=sandy loam; slt.=sligbtly; and tex.=texture.

[3] "Somewhat poor" may also he used for this soil drainage class.

[4] Associated soils often occur in the field with tbose soils shown on the same lines, but usually differ in one or more characteristics. Some soils shown in a given area are also listed as associated soils in otber areas. Names of associated soils are given in the indexes on pages 44 and 46, whicb also indicate wbere the characteristics of the various soils are discussed.

Table 1. — Continued

Area on general soil map	Parent material[2]	Surface color[2]	Degree of development[2]	Natural internal drainage class				Associated soil type numbers[1]
				Well	Moderately well	Imperfect[3]	Poor	
	Med. tex. mat. <2 ft. thick on noncalc. sic.-c. >3½ ft. thick	Dark	Moderate			Denrock 262	Perrot 568	110, 261, 576
		Light	Mod. strong		Colp 122	Hurst 338	Okaw 84	26
	Med. tex. mat. <1½ ft. thick on sic.-c., calc. at 2-3½ ft.	Light	Moderate		Markland 467	McGary 173		465
	Med. tex. mat. <1½ ft. thick on sicl., calc. at 2½-4 ft.	Dark	Moderate		Gilmer 341	Martinton 189	Milford 69	
		Light	Moderate			DelRey 192		
	Med. tex. mat. 3-5 ft. thick on loamy mat.	Light	Moderate	Wheeling 463	Sciotoville 462	Weinhach 461	Ginat 460	469
	Med. tex. mat. 3½-5 ft. thick on sand or fine sand	Dark	Moderate			LaHogue 102	Selma 125	130, 188, 265
	Med. tex. mat. or loess 2-3½ ft. thick on sand or fine sand	Dark	Moderate	——Pilot 159——				
		Light	Moderate	——Thebes 212——		Tamms 211		
X	Sand, fine sand, loamy sand, or loamy fine sand >5 ft. thick	Dark	None to 5 ft.	Hagener 88		Watseka 49	Maumee 89	
		Light	None to 5 ft.	Plainfield 54, 90			Kilhourne 203	270
		Dark	Weak at 3-5 ft.	Ade 98				
		Light	Weak at 3-5 ft.	Bloomfield 53				31
	Sandy loam and fine sandy loam 1½-3 ft. thick on sand, fine sand, loamy sand, or loamy fine sand at 3-5 ft.	Dark	Weak	——Dickinson 87——		Hoopeston 172, 237	Gilford 201	266
		Light	Weak	——Lamont 175——				332
		Dark	Moderate	——Onarga 150, 190——		Ridgeville 151, 156	Pittwood 130	101, 187, 200, 202, 359, 673
		Light	Moderate	——Alvin 131, 144——		Rohy 184, 185	Ruark 178	101, 187, 200
	Med. tex. mat. <1 ft. thick on limestone	Dark	None-weak				Romeo 316	
	Med. tex. mat. 1-2½ ft. thick on limestone	Dark	Weak-mod.	——Channahon 315——			Joliet 314	
		Light	Weak-mod.	——Ritchey 311——				
	Med. tex. mat. 2½-4 ft. thick on limestone	Dark	Moderate			Plattville 220	Millsdale 317	
	Loess 1-2½ ft. thick on <1 ft. of limestone residuum on limestone at 1½-3 ft.	Dark	Moderate	Dodgeville 40				
		Light	Moderate	Dubuque 29				413, 471, 511
	Loess 2½-4 ft. thick on <1 ft. of limestone residuum on limestone at 3-5 ft.	Dark	Moderate	Ashdale 411				
		Light	Moderate	Palsgrove 429				
Y	Loess and noncalc. cl. drift 2½-4 ft. thick on limestone	Dark	Moderate	Hitt 506				
		Light	Moderate	Woodhine 410				
	Med. tex. mat. <1 ft. thick on shale residuum or shale	Light	Weak-mod.		Gosport 551			

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Table 1. — Concluded

Area on general soil map	Parent material[2]	Surface color[2]	Degree of development[2]	Natural internal drainage class				Associated soil type numbers[4]
				Well	Moderately well	Imperfect[3]	Poor	
	Loess 1-2½ ft. thick on shale residuum or shale	Dark	Moderate		Schapville 418			
		Light	Moderate		Derinda 417			309, 549
	Loess 2½-4 ft. thick on shale residuum or shale	Dark	Moderate	——Keltner 546——		Loran 572		
		Light	Moderate	——Eleroy 547——				
	Sl. and fsl. <1 ft. thick on Sandstone	Mod. dark	None	Bullard 389				
	Sandy mat. 1-3½ ft. thick on Sandstone	Dark	Weak-mod.	Hesch 390				
		Light	Weak-mod.	Boone 397				
	Calcareous sandy loam to sand or fine sand	Light	None	——Sarpy 92——				
	Calcareous medium textured sediments	Dark	Weak	——DuPage 321——		——Millington 82——		400
		Mod. dark	None	——Dorchester 239, 578——				
		Light	None		Jules 28			
	Slightly acid-neutral sl.-fsl. 2-3 ft. thick on sand	Dark	None-weak	——Landes 304——				
	Slightly acid-neutral med. tex. mat. 1-2½ ft. thick on sand	Dark	Weak	——Ware 456——				
	Slt. acid-neutral mod. f.-f. tex. mat. 1-2½ ft. thick on sand	Dark	Weak		Riley 452	——Bowdre 589——		
	Slt. acid-neutral med.-mod. f. tex. mat. 2½-4 ft. thick on sand	Dark	Weak			Newart 161	Gorham 162	248, 590
	Slightly acid-neutral med. tex. mat. 1½-3½ ft. thick on dark fine tex. soil	Dark	Weak			Radford 74		
		Light	None	——Arenzville 78——		Dupo 180		415
Z	Slightly acid-neutral med. tex. mat. >4 ft. thick	Dark	Weak	——Huntsville 77——		Lawson 451	Otter 76	
		Light	None-weak	——Haymond 331——		Wakeland 333	Birds 334	475
	Slightly acid-neutral mod.-fine tex. mat. >4 ft. thick	Dark	Weak	——Allison 306——		Tice 284	Beaucoup 70, 124	107, 302
		Light	Weak				Petrolia 288	
	Slightly acid-neutral fine tex. mat. >4 ft. thick	Dark	Weak				Wabash 83	
		Mod. dark	Weak				Darwin 71	
		Light	Weak				Karnak 426	
	Acid med. tex. mat. >4 ft. thick	Light	None-weak	——Sharon 72——		Belknap 382	Bonnie 108	427
	Acid mod. fine tex. mat. >4 ft. thick	Light	Weak				Piopolis 420	
	Acid mod. f. tex. mat. 2-3½ ft. thick on fine tex. mat.	Light	Weak				Cape 422	
	Acid fine tex. mat. >4 ft. thick	Light	Weak				Jacob 85	

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In the soil key, Table 1 on page 2, the major soils in the various soil associations are grouped on the basis of parent materials from which they have been formed, surface soil color, degree of development, and natural soil drainage. Information on individual soils can be found easily by referring to the alphabetical or numerical index of soils on pages 44 to 47. Also included in these lists are the symbols (capital letters) indicating the soil associations in which the soils occur and under which they are discussed in this publication. Page references to the discussions of the various soil associations are given in the contents at the front of this bulletin.

Soil parent materials as well as the other factors of soil formation are discussed on pages 34 to 39.

Surface soil color is a reasonably good guide to the organic matter content of Illinois soils. In general, soils in Illinois are either dark colored (developed under grass or prairie vegetation) or light colored (developed under trees or forest vegetation). The moderately dark-colored soils have developed under mixed forest and grass and are transitional between the two major surface soil color classes. Moderately dark-colored soils are shown in the same soil association with the light-colored soils on the general soil map and in Table 1. The two exceptions to this grouping are areas E and F where the soils formed under grass, but are strongly to very strongly developed and are only moderately dark colored. Also, in associations W, X, Y, and Z, dark-, moderately dark-, and light-colored soils are shown in the same soil association on the soil map and in Table 1 because the areas of each are often small or narrow.

Degree of development of a soil refers to the extent of weathering and change the parent materials have undergone in the formation of the soil. During formation soils develop horizons or layers. In weakly developed soils these horizons are not very distinct, but in strongly developed soils they are usually well differentiated in such properties as color, texture, and structure. The changes in appearance and physical properties associated with an increasing degree of development are usually accompanied by chemical changes such as increased weathering of soil minerals, increased acidity, and lower plant nutrient content. Among the dark-colored soils of the state, the nearly level, poorly drained soils with fine-textured surface horizons in each association are usually less developed than related, better drained soils.

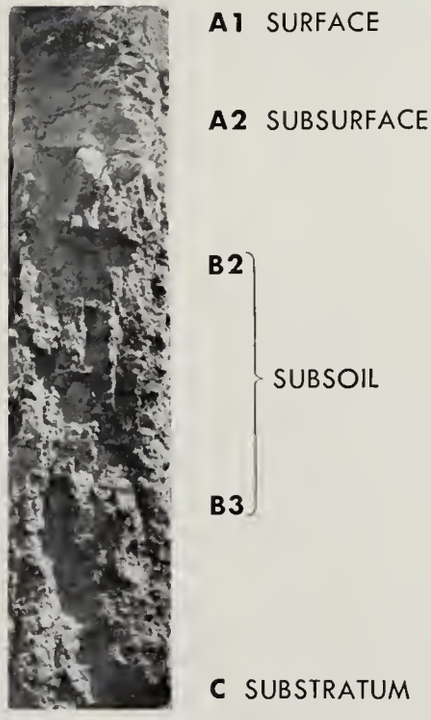
The natural internal soil drainage class refers to the degree of wetness under which the soils formed and does not refer to artificial drainage. The natural soil drainage classes may indicate the need or lack of need for drainage, but do not indicate drainability.

The soil associations are named from two or more of their important soil series and are described starting on page 8. Approximate acreage and proportionate extent of each association in the state are given in Table 2.

Table 2. — Acreage and Proportionate Extent of Various Soil Associations of Illinois

Soil association		Acres	Percent of state
Symbol	Name		
A	Joy-Tama-Muscatine-Ipava-Sable	4,761,000	13.2
B	Sidell-Catlin-Flanagan-Drummer	2,613,000	7.2
C	Wenona-Rutland-Streator	116,000	.3
D	Harrison-Herrick-Virden	960,000	2.7
E	Oconee-Cowden-Piasa	671,000	1.9
F	Hoyleton-Cisne-Huey	1,798,000	5.0
G	Warsaw-Carmi-Rodman	224,000	.6
H	Ringwood-Griswold-Durand	152,000	.4
I	LaRose-Saybrook-Lisbon	892,000	2.5
J	Elliott-Ashkum-Andres	1,328,000	3.7
K	Swygert-Bryce-Clarence-Rowe	776,000	2.2
L	Seaton-Fayette-Stronghurst	2,094,000	5.8
M	Birkbeck-Ward-Russell	859,000	2.4
N	Clary-Clinton-Keomah	2,888,000	8.0
O	Stookey-Alford-Muren	650,000	1.8
P	Hosmer-Stoy-Weir	2,137,000	5.9
Q	Ava-Bluford-Wynoose	2,989,000	8.3
R	Grantsburg-Robbs-Wellston	451,000	1.2
S	Fox-Homer-Casco	101,000	.3
T	McHenry-Lapeer-Pecatonica	209,000	.6
U	Strawn-Miami	90,000	.2
V	Morley-Blount-Beecher-Eylar	657,000	1.8
W	Littleton-Proctor-Plano-Camden-Hurst-Ginat	4,382,000	12.1
X	Hagener-Ridgeville-Bloomfield-Alvin	1,238,000	3.4
Y	Channahon-Dodgeville-Dubuque-Derinda	541,000	1.5
Z	Lawson-Beaucoup-Darwin-Haymond-Belknap	2,519,000	7.0
Totals		36,096,000	100.0

In the discussion of the soil associations, soil horizons or layers are defined as follows. The A horizon is the upper horizon and is commonly called *surface soil,* while the lower part of the A horizon is sometimes referred to as the *subsurface soil.* The B horizon is usually just below the A horizon and is often referred to as the *subsoil.* In most soils in Illinois, the subsoil has the highest clay content of any horizon in the soil profile. The C horizon is commonly thought of as soil parent material or underlying material and is often referred to as the *substratum.* Subdivisions of the three major horizons (A, B, and C) are shown in soil profile descriptions by numbers used with the letter designations, such as A1, A2, B1, B2, B3, C1, and so on (Fig. 1).



This is an example of a soil profile to a depth of 54 inches. Some of the major horizons are indicated. (Fig. 1)

The descriptive terms for slope in the discussions have the following gradients in percent: nearly level, 0 to 2 percent; gently sloping, 2 to 4 percent; moderately sloping, 4 to 7 percent; strongly sloping, 7 to 12 percent; very strongly sloping, 12 to 18 percent; steep, 18 to 30 percent; and very steep, more than 30 percent.

A table is included in the discussion of each soil association. It gives dominant slope; surface soil color and texture; subsoil color, texture, and permeability; texture and kind of substratum or underlying material; resistance to drouth; and estimated yields of corn, soybeans, and wheat for each soil.

Permeability as given in these tables is an integrated permeability for the entire subsoil and does not necessarily apply to individual sub-horizons. Moderate permeability is considered the most desirable. Soils having slow or very slow permeability have restricted water flow and tile are usually not recommended in those needing drainage. Soils with rapid or very rapid permeability, such as sandy soils, do not hold much water, even at field capacity. If the soils are wet because of their low-lying position, drainage may cause drouth problems if the water table is lowered too much.

Resistance to drouth is a reflection of the soil's capacity to store water so it will be available to plants and of the ability of the plant roots to penetrate the soil and obtain the water. All of Illinois is subjected to occasional dry periods in some years. Those dry periods, which occur in July and August when temperatures are apt to be high, often reduce the yields of such crops as corn and soybeans to some extent. The ability of the soil to furnish water to plants during this type of dry period is what is meant by drouth resistance.

Crop yield estimates given in the table in each soil association are for the dominant slope listed and for uneroded or only slightly eroded conditions during the 10-year period, 1956 to 1965, under a high level of management. Practices needed for a high level of management vary with soils and crops, but in general include balanced and adequate application of needed plant nutrients; maintenance of good soil physical condition; maintenance of adequate drainage and control of flooding and erosion where needed; control of weeds, diseases, and insect pests; use of improved, adapted crop varieties; and use of proper procedures to cut harvesting losses. The practices essential for high-level management must be applied over a period of time and adjusted periodically to take advantage of improved management techniques. With improved technology and management, average crop yields can be expected to increase over the estimates given in this bulletin. Yields are omitted for some soils for which crops are not adapted.

Crop adaption is related to climate, but also to soils in Illinois. Maps showing average annual temperature, average annual precipitation, and average number of frost-free days in Illinois are on pages 37 and 38. Most of the common field crops can be grown in all areas of the state. However, spring oats are better adapted to northern Illinois and winter oats to southern Illinois. Cotton is restricted to the extreme southern end of the state. Tree fruits such as apples and peaches, but especially peaches, are best adapted in the southern one-half of the state. Forests are more extensive in southern Illinois, but this is related more to topography, soils, and native vegetation than to climate. Most corn is grown in central and northern Illinois. Most soybeans and wheat are grown

in the southern two-thirds of the state, and acreages of oats and hay are highest in the northern one-third. Crop acreages and trends in acreages over the past 90 to 100 years, as well as general yield trends of the major field crops in Illinois, are discussed in Illinois Extension Circular 901.

Soil Association A

Joy-Tama-Muscatine-Ipava-Sable Soils

Soil association A occurs in the northwestern and west-central parts of the state and occupies 4,761,000 acres or 13.2 percent of the state. The vast majority of the area is nearly level to moderately sloping and is found on the broader upland divides where drainage systems are not well developed.

Joy, Muscatine, Ipava, and Sable soils are found on the moderately sloping to nearly level areas. On the strongly sloping areas along shallow stream valleys and on morainal knobs and ridges, Tama and Port Byron soils are common. All of these soils are dark colored and have developed under prairie from loess more than 4 to 5 feet thick.

Joy and Port Byron are weakly developed soils with silt loam A horizons and silt loam to heavy silt loam B horizons. They occur in a relatively narrow belt of association A near the Mississippi river valley, and the Green river basin in northern Henry County. Tama and Muscatine soils are moderately developed and have silt loam A horizons and silty clay loam B horizons. They occur mainly in northwestern Illinois and have developed from somewhat finer textured loess than Joy and Port Byron soils. Bolivia and Ipava soils have somewhat more clay in the B horizons than Tama and Muscatine soils and are most common in west-central Illinois. Sable soils are poorly drained, weakly developed, silty clay loam soils which occur throughout the area in nearly level or slightly depressional landscape positions. See Tables 1 and 3.

All of the major soils in association A are permeable and very highly productive under a high level of management. Native fertility was high, but crops on most areas now respond to lime and nitrogen applications and to some extent to potash and phosphorus additions. Erosion control is needed on the more sloping areas and drainage is needed in the nearly level to depressional areas. Field tile are normally used for drainage. Corn, soybeans, wheat, mixed hay, and oats are the main crops grown. Corn and soybean acreages far exceed those of the other crops. Large acreages are used for cash grain crops, but hog and cattle feeding are important, especially in that portion of the area between the Illinois and Mississippi rivers.

Soil Association B

Sidell-Catlin-Flanagan-Drummer Soils

This soil association occurs in east-central and north-central Illinois. It occupies 2,631,000 acres or 7.2 percent of the state. These grassland soils are dark colored and occur on nearly level to strongly sloping upland areas.

Moderately well- to well-drained Catlin, and im-

Table 3. — Characteristics and Estimated Crop Yields of Soil Association A — Joy-Tama-Muscatine-Ipava-Sable Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
246 Bolivia	2-6	Very dark brown	sil	Brown	sicl	Moderate	sil loess	Very good	100	35	43
43 Ipava	1-3	Very dark brown to black	sil	Gray and brown	heavy sicl	Moderate	sil loess	Very good	110	39	47
275 Joy	1-3	Very dark brown	sil	Brown	heavy sil	Moderate	sil loess	Very good	107	34	40
41 Muscatine	1-3	Very dark brown to black	sil	Gray and brown	sicl	Moderate	sil loess	Very good	115	38	46
277 Port Byron	3-10	Very dark grayish-brown	sil	Yellowish-brown	heavy sil	Moderate	sil loess	Very good	94	34	40
68 Sable	0-1	Black	sicl	Dark gray	sicl	Moderate	sil loess	Very good	104	39	42
36 Tama	3-7	Very dark brown	sil	Brown	sicl	Moderate	sil loess	Very good	106	35	42
Associated soils											
276 Biggsville	2-8	Very dark grayish-brown	sil	Brown	heavy sil	Moderate	sil loess	Good	98	30	35
660 Coatsburg	7-15	Very dark gray	sil	Gray and brown	sicl-c	Slow to very slow	sic-c till or wash	Poor	50	18	22
45 Denny	0-1	Very dark grayish-brown	sil	Gray	heavy sicl	Slow	sil loess	Fair	76	30	35
272 Edgington	0-1	Very dark gray	sil	Dark gray	sicl	Moderately slow	sil loess	Good	88	34	38
249 Edinburg	0-1	Very dark gray	sicl	Dark gray	heavy sicl	Mod. slow to slow	sil loess	Good-very good	90	35	40
67 Harpster	0-1	Black to very dark gray	sicl	Dark gray	sicl	Moderate	sil loess	Good-very good	96	36	39
244 Hartsburg	0-1	Black	sicl	Dark gray to gray	sicl	Moderate	sil loess	Good-very good	96	36	40
44 Hartshurg	1-2	Black to very dark brown	sil	Dark gray to gray	sicl	Moderate	sil loess	Good-very good	98	37	42
562 Ideal	2-7	Very dark grayish-brown	sil	Yellowish-brown	sil	Moderate	sand	Good	86	25	34
470 Keller	3-7	Very dark grayish-brown	sil	Gray and brown	hv. sicl-sic	Slow	sic-c till or wash	Fair	65	25	28
34 Tallula	4-12	Very dark grayish-brown	sil	Brown	sil	Moderate	sil loess	Good	85	28	36
564 Ustick	4-12	Very dark grayish-brown	sil	Yellowish-brown	sil	Moderate	sand	Fair	76	23	32
47 Virden	0-2	Black to very dark gray	sil	Dark gray	heavy sicl	Moderately slow	sil loess	Very good-good	98	36	45

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Maintaining grass in shallow waterways is an effective way of preventing scouring and downcutting in such areas. (Fig. 2)

perfectly drained Flanagan were formed in 3 to 5 feet of loess over loam to silty clay loam till. They are moderately to moderately strongly developed with silty clay loam to heavy silty clay loam B horizons. Catlin occurs on low, gently to moderately sloping knolls, whereas Flanagan occurs on nearly level, loess-covered till plains. Sidell, Dana, and Raub soils were formed in 1 to 3 feet of loess over till and have silty clay loam upper B horizons and clay loam lower B horizons developed from both loess and till. They are moderately developed. Sidell and Dana soils occur on more sloping, morainic areas, in general, than Catlin and Flanagan. Drummer, which is a nearly level, poorly drained silty clay loam soil, occurs in association with both groups, as well as with soils of associations I and W. See Table 4.

Major problems in this area are fertility, erosion control on the more sloping areas, and drainage on the nearly level areas. These soils have high available moisture storage capacities and are very highly productive under a high level of management. Crops respond to lime and nitrogen applications and to some extent to phosphate and potash applications.

Erosion control is needed on sloping areas and can be provided by such measures as contouring, grass waterways, or including sod crops regularly in rotations. These soils are permeable and excess water can be removed from them by use of tile. A very high percentage of this association is tillable. The area is well adapted to the use of large machinery and cash grain is the main type of farming. Much of the land is used to raise corn and soybeans, but wheat, hay, and some oats are also grown. Some livestock is raised throughout this area, but it is more common in the north-central than in the east-central portion (Fig. 2).

Soil Association C

Wenona-Rutland-Streator Soils

Soil association C occurs in north-central Illinois and is of minor extent, occupying 116,000 acres or 0.3 percent of the state. Some of these soils may also occur in loess-covered, glacial lakebed areas in the central part of the state.

The soils in association C are dark colored, having been formed under grass vegetation, and occur on nearly level to strongly sloping upland areas. They have developed from 3 to 5 feet of loess on silty clay to clay till or drift and have heavy silty clay loam to silty clay subsoils that are moderately slowly permeable.

Because of the somewhat slowly permeable subsoils and underlying materials, crop yield reduction caused by erosion or loss of topsoil is greater than on more permeable

Table 4. — Characteristics and Estimated Crop Yields of Soil Association B — Sidell-Catlin-Flanagan-Drummer Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
171 Catlin	3–7	Very dark brown	sil	Brown	sicl	Moderate	l-sicl till	Very good-good	100	36	44
56 Dana	3–7	Very dark brown	sil	Brown	sicl-cl	Moderate	l till	Very good	97	35	43
152 Drummer	0–1	Black	sicl	Dark gray	sicl	Moderate	l wash	Very good	102	40	43
154 Flanagan	1–3	Black to very dark gray	sil	Gray and brown	hv. sicl	Moderate	l-sicl till	Very good	112	39	48
481 Raub	1–3	Black to very dark gray	sil	Gray and brown	sicl-cl	Moderate	l till	Very good	105	38	46
55 Sidell	6–12	Very dark grayish-brown	sil	Yellowish-brown	sicl-cl	Moderate	l till	Very good	95	34	42
Associated soils											
67 Harpster	0–1	Black to very dark gray	sicl	Dark gray	sicl	Moderate	l wash	Good-very good	96	36	39
153 Pella	0–1	Very dark gray to black	sicl	Dark gray	sicl	Moderate	l wash	Good-very good	98	38	41
330 Peotone	0–1	Black	hv. sicl	Very dark gray	hv. sicl	Moderately slow	sicl wash	Good	85	33	31

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Table 5. — Characteristics and Estimated Crop Yields of Soil Association C — Wenona-Rutland-Streator Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
375 Rutland	1–3	Black to very dark gray	sil	Gray and brown	hv. sicl-sic	Moderately slow	sic-c till or drift	Good	94	35	42
435 Streator	0–1	Black	hv. sicl	Dark gray	hv. sicl-sic	Moderately slow	sic-c till or drift	Good	92	35	37
388 Wenona	3–7	Very dark brown	sil	Brown	heavy sicl	Moderately slow	sic-c till or drift	Good	88	33	37
Associated soils											
235 Bryce	0–2	Black to very dark gray	sic	Dark gray	sic	Slow	sic till or drift	Good	87	34	35
330 Peotone	0–1	Black	hv. sicl	Very dark gray	heavy sicl	Moderately slow	sicl wash	Good	85	33	31
91 Swygert	1–6	Very dark gray to black	sicl	Gray and brown	sic	Slow	sic till or drift	Good	84	31	39

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

soils. Greatest need for erosion control is on Wenona soils. Drainage is needed on imperfectly drained Rutland and poorly drained Streator soils, but tile tend to function slowly. See Table 5.

These soils are moderately strongly developed, but are highly productive if erosion control, adequate drainage, proper soil treatment, and other good management practices are used. Crops respond to lime and nitrogen applications. Wheat and hay crops also respond to phosphate and potash. Corn and soybeans are the most important crops, but wheat, oats, and hay are also grown. Some livestock is produced. Much of the area is adapted to the use of large machinery and production of grain crops will continue to be important in this soil association.

Soil Association D

Harrison-Herrick-Virden Soils

This soil association occurs in southwestern and western Illinois and occupies 960,000 acres or 2.7 percent of the state. These dark-colored soils have developed under grass from 5 to 7 feet of loess on weathered Illinoian till.

Well-drained Douglas is usually underlain by reddish, water-worked Illinoian drift and the other soils by weathered Illinoian till. These soils occur on nearly level to strongly sloping uplands and are moderately strongly developed. Well-drained Douglas and moderately well-drained Harrison have dark A horizons and brownish silty clay loam B horizons. Imperfectly drained Herrick has a dark-colored A1 horizon, a grayish A2 horizon, and a mottled gray and brown, heavy silty clay loam to light silty clay B horizon. Poorly drained Virden soils have dark-colored, silty clay loam A and upper B horizons and dark gray, silty clay loam lower B horizons. Piasa soils, which are high in sodium and less productive, occur in some areas in a complex pattern with Herrick. See Table 6.

Drainage is needed on Virden soils and on many areas of Herrick and Piasa soils. Tile are usually used in Virden and Herrick to furnish drainage, but tend to function somewhat slowly because of moderately slowly permeable subsoils. Tile do not function satisfactorily in Piasa soils.

Table 6. — Characteristics and Estimated Crop Yields of Soil Association D — Harrison-Herrick-Virden Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
128 Douglas	4–12	Very dark grayish-brown	sil	Yellowish-brown	sicl	Moderate	sil loess	Good-very good	90	34	41
127 Harrison	3–7	Very dark brown	sil	Brown	sicl	Moderate	sil loess	Good-very good	92	35	43
46 Herrick	1–3	Black to very dark gray	sil	Gray and brown	heavy sicl	Moderately slow	sil loess	Good-very good	94	38	46
47 Virden	0–2	Black to very dark gray	sil	Dark gray	heavy sicl	Moderately slow	sil loess	Very good-good	98	36	45
50 Virden	0–1	Black to very dark gray	sicl	Dark gray	heavy sicl	Moderately slow	sil loess	Good-very good	96	36	42
Associated soils											
259 Assumption	5–10	Very dark grayish-brown	sil	Yellowish-brown	sicl	Moderate	cl-sicl till	Good	84	30	38
252 Harvel	0–1	Black to very dark gray	sicl	Gray	sil-sicl	Mod. slow to mod.	sil loess	Good	90	32	32
256 Pana	6–15	Very dark grayish-brown	sil	Dark brown	l-gcl	Moderate	gcl-s	Fair	70	24	33
474 Piasa	0–2	Very dark gray	sil	Gray to olive gray	sicl-sic	Slow to very slow	sil loess	Fair to poor	55	22	26
138 Shiloh	0–1	Black	hv. sicl-sic	Dark gray	hv. sicl-sic	Mod. slow to slow	sicl wash	Good	92	34	40
250 Velma	5–12	Very dark grayish-brown	l-sil	Brown	cl	Mod. to mod. slow	cl till	Good	78	28	36

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Erosion control is needed on Douglas and Harrison soils and can normally be supplied by contouring, terracing, or the use of longer crop rotations, including regular use of sod crops.

Fertility is a general problem on these soils. Crops respond well to lime, nitrogen, and potash, and wheat and legume hay especially respond to phosphate applications. Crop yields are high under a high level of management. Corn, soybeans, and wheat are the major crops. Some hay is grown, but very little oats. Large acreages of soybeans are grown in the eastern portion of this area. Many farms have livestock, and dairy farms are important in southwestern Illinois near St. Louis. Beef cattle and hogs are most important in western Illinois. A very high percentage of this association is nearly level to gently sloping and well adapted to large farming operations.

Soil Association E

Oconee-Cowden-Piasa Soils

The Oconee-Cowden-Piasa soil association occurs in south-central and southwestern Illinois and occupies 671,000 acres or 1.9 percent of the state. These soils occur on nearly level to moderately sloping uplands, and have developed under grass vegetation from 4 to 6 feet of loess on weathered Illinoian till.

Although developed under grass, these silt loam soils are only moderately dark colored in the A1 horizon because they are acid and strongly developed. All of these soils have grayish A2 horizons. Moderately well-drained O'Fallon has a brown and gray silty clay loam B horizon and a fragipan or siltpan in the lower part of its subsoil. Imperfectly drained Oconee and poorly drained Cowden soils have heavy silty clay loam to light silty clay, grayish, mottled B horizons. Poorly drained Piasa soils have gray to olive gray mottled heavy silty clay loam to light silty clay B horizons that are high in sodium and have poor physical condition. Piasa soils often occur in a complex pattern with Cowden soils. Although Piasa soils are less productive and less well adapted to corn and soybeans than associated soils, they are usually farmed with surrounding soils. See Table 7.

Fertility, erosion control, and drainage are the major problems on these soils. Large applications of lime, potash, and nitrogen are needed for good crop yields. Wheat and legumes also respond to phosphate. With adequate soil treatment, yields are moderately high. On the more sloping areas erosion control is needed, and on the nearly level areas drainage is necessary. Erosion control is usually achieved by use of contouring, terracing, or suitable crop rotations and grass waterways. Drainage is provided on the nearly level areas by use of surface ditches because tile do not function satisfactorily in the slowly permeable subsoils of this group of soils. A high percentage of this association is nearly level to gently sloping and well adapted to use of large machinery. Dairying is important in the southwestern portion of this area. Corn, soybeans, wheat, and mixed hay are the major crops grown. Average crop yields can be increased on many farms in this area by using large amounts of limestone and fertilizers.

Soil Association F

Hoyleton-Cisne-Huey Soils

The Hoyleton-Cisne-Huey soil association occurs on uplands in south-central and southern Illinois and occupies 1,798,000 acres or 5 percent of the state. These soils have developed under grass vegetation from 2½ to 4 feet of loess on weathered Illinoian till. They are acid, strongly to very strongly developed soils and are only moderately dark colored even though formed under the influence of grass vegetation. All of these soils have silt loam A horizons, light-colored A2 horizons, and B horizons that extend into the till beneath the loess.

Moderately well-drained Richview has a brown and gray silty clay loam B horizon. Imperfectly drained

Table 7. — Characteristics and Estimated Crop Yields of Soil Association E — Oconee-Cowden-Piasa Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
112 Cowden	1–3	Very dark gray	sil	Grayish-brown to gray	hv. sicl-sic	Slow	sil loess	Good	89	35	43
113 Oconee	2–7	Very dark gray	sil	Gray and brown	heavy sicl	Slow	sil loess	Good	85	32	42
114 O'Fallon	4–8	Very dark grayish-brown	sil	Brown and gray	sicl	Mod. slow to slow	sil loess	Good to fair	76	26	36
Associated soils											
48 Ebbert	0–1	Very dark gray	sil	Dark gray	sicl	Slow	cl till	Good-very good	92	37	43
120 Huey	0–2	Dark grayish-brown	sil	Gray	sicl	Very slow	cl-sicl till	Poor	50	20	24
474 Piasa	0–2	Very dark gray	sil	Gray to olive gray	sicl-sic	Slow to very slow	sil loess	Fair to poor	55	22	26
138 Shiloh	0–1	Black	hv. sicl-sic	Dark gray	hv. sicl-sic	Mod. slow to slow	sicl wash	Good	92	34	40
581 Tamalco	1–5	Very dark grayish-brown	sil	Reddish-brown to gray	heavy sicl	Slow to very slow	sil loess or till	Poor to fair	52	21	25
250 Velma	5–12	Very dark grayish-brown	l-sil	Brown	cl	Mod. to mod. slow	cl till	Good	78	28	36
584 Walshville	4–12	Dark grayish-brown	l	Brown and gray	cl	Very slow to slow	cl-l till	Poor	40	15	18

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Table 8. — Characteristics and Estimated Crop Yields of Soil Association F — Hoyleton-Cisne-Huey Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
2 Cisne	0–2	Very dark grayish-brown	sil	Grayish-brown to gray	heavy sicl	Slow to very slow	sicl-cl till	Good	84	31	40
3 Hoyleton	1–4	Very dark grayish-brown	sil	Gray and brown	heavy sicl	Slow	l-cl till	Good	83	30	41
4 Richview	3–7	Very dark grayish-brown	sil	Brown and gray	sicl	Moderately slow	l till	Good	76	26	36
Associated soils											
287 Chauncey	0–2	Very dark gray	sil	Dark gray	heavy sicl	Slow	sil-sicl loess or wash	Good	89	35	43
48 Ebbert	0–1	Very dark gray	sil	Dark gray	sicl	Slow	cl till	Good-very good	92	37	43
120 Huey	0–2	Dark grayish-brown	sil	Gray	sicl	Very slow	cl-sicl till	Poor	50	20	24
167 Lukin	1–3	Very dark grayish-brown	sil	Brown and gray	sicl	Slow	sil-sicl loess or wash	Good	88	33	44
218 Newberry	0–1	Very dark grayish-brown	sil	Gray	sicl	Slow	cl-sicl till	Good	86	34	38
581 Tamaleo	1–5	Very dark grayish-brown	sil	Reddish-brown to gray	heavy sicl	Slow to very slow	sil loess or till	Poor to fair	52	21	25
584 Walshville	4–12	Dark grayish-brown	l	Brown and gray	cl	Very slow to slow	el-l till	Poor	40	15	18

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Hoyleton and poorly drained Cisne have grayish, silty clay loam to light silty clay B horizons. Huey soils have grayish, silty clay loam B horizons that are high in sodium. Huey occurs in areas of irregular size and shape, intermingled with Hoyleton and Cisne soils and is usually farmed with them. Huey soils are less productive and less well adapted to corn and soybeans than the other soils in this association. See Table 8.

The soils in soil association F occur on nearly level to moderately sloping uplands. The high percentage of nearly level to gently sloping land in this area makes it well adapted to the use of large machinery. Large applications of limestone and fertilizers are necessary on these soils, and crop yields are moderately high under a high level of management. Most crops respond very well to applications of limestone, nitrogen, potassium, and phosphate, except that corn responds little to phosphate.

Erosion control is needed on the more sloping areas and can be achieved by contouring, terracing, or use of sod crops regularly in rotations. Drainage is needed on the nearly level areas and is usually provided by shallow ditches. These soils are ordinarily plowed into narrow "lands" so that a bedded drainage system is formed to carry off excess water. The subsoils of Cisne and Hoyleton are slowly to very slowly permeable and tile do not function satisfactorily. Even though the subsoils of these soils are not very permeable, roots of the common field crops penetrate the subsoils when adequate limestone and fertilizers are applied to the plow layer. Corn, soybeans, wheat, and mixed hay are the major crops of this area. A mixed type of farming, including livestock as well as grain production, is most common.

Soil Association G

Warsaw-Carmi-Rodman Soils

Soil association G occurs in northeastern Illinois and in the upper regions of both the Illinois and Wabash river valleys. Total extent of this area in Illinois is relatively small, amounting to 224,000 acres or 0.6 percent of the state. These soils occur on nearly level to moderately sloping uplands and on stream terraces. A few areas are strongly to very strongly sloping, but these more sloping areas are on short terrace breaks or on morainic knobs or kames. These dark-colored soils have developed under grass vegetation from thin medium-textured material on gravel.

Well-drained Warsaw, imperfectly drained Kane, and poorly drained Will comprise one group of soils in association G. These soils are moderately developed and have clay loam B horizons that are underlain by calcareous gravel at depths of 2 to 3½ feet. These soils are most common in northeastern Illinois and in the Illinois river valley. Well-drained Carmi, imperfectly drained Omaha, and poorly drained Abington and associated soils are moderately to weakly developed and have clay loam to gravelly clay loam B horizons that are underlain by noncalcareous gravel at depths of 2 to 3½ feet. These soils are most common in the Wabash river valley. Rodman soils, which have very little B development, occur in association with both of the above groups, either on steep slopes or on gravelly areas where the medium-textured overburden is very thin. Stockland and Stonington soils are also thin to gravel and have gravelly clay loam B horizons. See Table 9 and Fig. 3.

Major problems on these soils are drouthiness and fertility. Because of the thinness of these soils to gravel, their moisture storage capacities are rather low and summer crops, such as corn and soybeans, often suffer from lack of moisture. Wheat produces good yields, on the other hand, because it has completed growth by July and August when moisture is most often deficient. Crops generally respond to limestone, nitrogen, potash, and phosphate applications and average yields are moderate to moderately high, except on the soils that are very thin

Table 9. — Characteristics and Estimated Crop Yields of Soil Association G — Warsaw-Carmi-Rodman Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
300 Abington	0–1	Black	cl	Dark gray	cl	Moderate	gcl-s	Good	92	38	39
285 Carmi	1–5	Very dark grayish-brown	l	Brown	cl-gcl	Moderate	g and s	Fair	80	28	38
286 Carmi	1–5	Very dark grayish-brown	sl	Brown	cl-gcl	Moderate	g and s	Fair	78	26	36
343 Kane	1–3	Black to very dark brown	sil	Gray and brown	cl	Moderate	g and s	Fair-good	90	34	37
289 Omaha	0–2	Very dark gray	l	Brown and gray	cl-gcl	Moderate	g and s	Fair	83	32	39
290 Warsaw	1–8	Very dark grayish-brown	sil	Brown	cl	Moderate	g and s	Fair	84	33	37
329 Will	0–1	Black to very dark brown	siel	Dark gray	cl	Moderate	g and s	Fair	82	34	36
Associated soils											
318 Lorenzo	2–8	Very dark grayish-brown	sil	Dark brown	cl-scl	Moderately rapid	g and s	Fair to poor	68	24	32
305 Palestine	1–5	Very dark grayish-brown	l	Brown	cl-scl	Moderate	g and s	Fair	75	25	32
93 Rodman	7–25	Very dark brown	gl	Light and dark	g	Very rapid	gravel	Very poor	..	..	..
313 Rodman	1–8	Very dark brown	l	Light and dark	g	Very rapid	gravel	Very poor	..	..	..
155 Stockland	3–10	Very dark grayish-brown	l	Brown	g cl	Rapid	g or s	Poor	55	23	26
253 Stonington	3–10	Dark grayish-brown	l	Brown	g cl	Rapid	g or s	Poor	50	21	25
197 Troxel	0–2	Black	sil	Brown	siel	Moderate	g and s	Very good	102	37	38
79 Volinia	2–7	Very dark grayish-brown	sil	Brown	scl-cl	Mod.-mod. rapid	s and g	Fair	82	30	38

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Soils that are closely underlain by gravel usually have low moisture- and nutrient-holding capacities. (Fig. 3)

to gravel. Soil treatments must be added frequently. The soil often must be treated for the immediate crop, because these soils have relatively low capacities for holding plant nutrients and moisture. Many areas, especially those in the Wabash and Illinois river valleys, are underlain by water-bearing gravel and sand and can be economically irrigated. Wheat is the major crop on these soils in the Wabash valley, although some corn, soybeans, and alfalfa are also grown. In northeastern Illinois, corn, oats, wheat, soybeans, and hay and pasture are grown though some of the more gravelly areas are in trees or left idle. Many of the more level areas, which have water available at reasonable depths for irrigation, are well adapted to vegetable production. However, only a few areas are used for truck crops. Supplemental irrigation and adequate, timely fertilization can be used to raise average crop yields in many areas of this soil association.

Soil Association H

Ringwood-Griswold-Durand Soils

Soil association H occurs in northern Illinois on gently to strongly sloping uplands. It occupies 152,000 acres or 0.4 percent of the state. This association is composed primarily of four dark-colored, moderately developed soils formed under grass vegetation. All four soils are well to moderately well drained and have silt loam A horizons.

Ogle soils have developed in 2½ to 5 feet of loess on noncalcareous clay loam to sandy clay loam drift and have brownish, silty clay loam B horizons. Durand soils are similar in many respects to Ogle soils, but have been formed in a thinner loess mantle (1½ to 3 feet thick) and have greater sand content in the B horizon. Ringwood soils have been formed in 1 to 3 feet of loess on sandy loam till and have calcareous sandy loam till within a depth of 4 feet. They have brownish, clay loam B horizons. Griswold soils are similar to Ringwood soils, but have been formed from a thinner loess mantle (less than 1 foot thick) and have brownish, clay loam to sandy clay loam B horizons. Ogle and Durand soils are more common in the western part and Ringwood and Griswold

Table 10. — Characteristics and Estimated Crop Yields of Soil Association H — Ringwood-Griswold-Durand Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
416 Durand	1–10	Very dark brown	sil	Reddish-brown	cl-sicl	Moderate	sl-l till	Good-very good	90	32	40
363 Griswold	2–10	Very dark brown	l	Brown	cl-scl	Moderate	sl till	Good-fair	84	30	38
412 Ogle	4–10	Very dark brown	sil	Brown	sicl	Moderate	sl-l till	Good-very good	90	31	39
297 Ringwood	2–7	Very dark brown	sil	Brown	cl	Moderate	sl till	Good-very good	94	35	43
Associated soils											
191 Knight	0–1	Very dark gray	sil	Gray	sicl-cl	Mod. slow	sl-g	Good	78	34	36
197 Troxel	0–2	Black	sil	Brown	sicl	Moderate	g and s	Very good	102	37	38

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

soils are more common in the eastern part of this soil association. See Table 10.

All of these soils are permeable and have good moisture-holding capacities. Crop yields are generally high under a high level of management. Crops respond to limestone, nitrogen, phosphate, and to some extent to potash applications. Corn, oats, wheat, legume hay and mixed pasture, and soybeans are the main crops grown. Erosion control is needed on the more sloping areas and can ordinarily be provided by the use of contouring, terracing, grass waterways, and suitable rotations. Dairying is the most common type of farming in this soil association.

Soil Association I

LaRose-Saybrook-Lisbon Soils

Soil association I occurs in northeastern Illinois on nearly level to strongly sloping uplands and occupies 892,000 acres or 2.5 percent of the state. These dark-colored, permeable soils have developed from thin loess on loam till that is calcareous at depths of less than 3½ feet.

Two groups of soils occur in this association. One is moderately well- to well-drained Saybrook and imperfectly drained Lisbon soils that have formed in 1½ to 3 feet of loess on loam till. The other is well-drained Parr, moderately well-drained Corwin, and imperfectly drained Odell soils that have formed in less than 1½ feet of loess on loam till. This latter group of soils is most common in extreme northeastern Illinois or on the more sloping morainic areas where the loess is generally very thin. They have more sand throughout their B horizons than Saybrook and Lisbon soils, which have silty clay loam upper B horizons and clay loam lower B horizons. Well-drained LaRose soils, formed entirely in till on morainic knobs, occur with both of the above groups. Poorly drained Pella soils, in which carbonates occur between depths of 1 and 3 feet, occur with Parr, Corwin, and Odell soils as well as with other soils such as those of association B. See Table 11.

Major problems on these soils are fertility, erosion control on the more sloping areas, and drainage on the nearly level areas. Crop yields are high on these soils under a high level of management. Crops respond to limestone, nitrogen, phosphate, and to some extent to potash applications. Limestone and fertilizer requirements for high yields are generally moderate.

Table 11. — Characteristics and Estimated Crop Yields of Soil Association I — LaRose-Saybrook-Lisbon Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to droutb	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
495 Corwin	3–10	Very dark brown	sil	Brown	cl-sicl	Moderate	l till	Good-very good	96	35	43
60 LaRose	7–15	Very dark grayish-brown	sil	Brown	cl	Moderate	l till	Fair-good	78	27	32
59 Lisbon	1–3	Very dark brown to black	sil	Gray and brown	sicl-cl	Moderate	l till	Very good	106	39	46
490 Odell	1–5	Very dark brown to black	sil	Gray and brown	cl-sicl	Moderate	l till	Good-very good	100	37	44
221 Parr	5–12	Very dark brown	sil	Brown and gray	cl-sicl	Moderate	l till	Good-very good	95	33	42
153 Pella	0–1	Very dark gray to black	sicl	Dark gray	sicl	Moderate	l wash	Good-very good	98	38	41
145 Saybrook	2–7	Very dark brown	sil	Brown	sicl-cl	Moderate	l till	Very good	98	36	44
Associated soils											
204 Ayr	2–8	Very dark brown	sl	Brown	scl	Mod. to mod. rapid	l till	Fair	84	31	35
152 Drummer	0–1	Black	sicl	Dark gray	sicl	Moderate	l wasb	Very good	102	40	43

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Erosion control on the more sloping areas can usually be provided by contouring, terracing, grass waterways, and suitable rotations. The poorly and imperfectly drained soils needing drainage can be tiled satisfactorily. Corn, oats, legume hay and pasture, and soybeans are the major crops grown in the northern part of this soil association where dairy and feeder cattle and sheep are important livestock enterprises. Corn, soybeans, and wheat are the most important crops in the southern part of this association.

Soil Association J

Elliott-Ashkum-Andres Soils

Soil association J occurs on uplands in northeastern Illinois and occupies 1,328,000 acres or 3.7 percent of the state. It is composed of three groups of dark-colored, grassland soils, all underlain by silty clay loam till at depths of less than 3 to 4 feet.

Varna, Elliott, and Ashkum soils have developed from medium-textured material less than 2 feet thick on silty clay loam till that becomes calcareous at less than 3 feet. Symerton, Andres, and Reddick soils have developed from medium-textured material 2 to 4 feet thick on silty clay loam till. Reddick occurs in flat or slightly depressional areas and is poorly drained. It usually has greater depth to the underlying till than better drained, more sloping Symerton and Andres soils. Moderately well- to well-drained Rankin and imperfectly drained Wesley soils have developed from sandy material 1½ to 3½ feet thick on silty clay loam till. The latter two moderately to weakly developed sandy soils are of minor extent.

The soils of association J occur on nearly level to strongly sloping uplands. Topography is generally more rolling with slopes being somewhat shorter and interrupted by more potholes or depressions than in association I. Muck and peat soils occur in some of the depressions. Most of the major soils in association J are moderately developed. The upper part of their profiles is usually moderately permeable, but where the lower part of the soil has developed from silty clay loam till or the calcareous silty clay loam till is at relatively shallow depths, permeability is moderately slow and roots of annual crops such as corn and soybeans do not penetrate as deeply as in the more permeable till-derived soils of association area I. Varna, Elliott, and Ashkum have heavy silty clay loam to light silty clay B horizons and Symerton, Andres, and Reddick soils have clay loam B horizons. See Table 12.

Tile can be used to drain Elliott, Ashkum, Andres, and Reddick soils, but function somewhat slowly in Elliott and Ashkum. Erosion control measures, such as contouring and terracing, are somewhat difficult to use in this association because of the intermingling of short, choppy slopes and depressions. Grass waterways are essential in draws. Because these soils, especially Varna and Elliott, are somewhat thin to the underlying calcareous till, loss of topsoil reduces crop yields more than it does on thicker soils in which roots penetrate deeper.

Yields, in general, are moderately high to high under a high level of management. Crops respond to limestone, nitrogen, phosphate, and to some extent to potash applications. Corn, soybeans, hay and pasture, oats, and wheat are the main crops grown. Many farms have some livestock, and dairying is important in the northern portion of the area.

Table 12. — Characteristics and Estimated Crop Yields of Soil Association J — Elliott-Ashkum-Andres Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
293 Andres	1–3	Black to very dark brown	sil	Gray and brown	cl	Moderate	sicl till	Good-very good	104	38	45
232 Ashkum	0–1	Black	sicl	Dark gray	heavy sicl	Moderately slow	sicl wash or till	Good-very good	94	36	40
146 Elliott	1–3	Very dark brown to black	sil	Gray and brown	hv. sicl-sic	Moderately slow	sicl till	Good-very good	92	34	42
157 Rankin	1–4	Very dark grayish-brown	sl	Brown	scl-hv. sl	Mod. to mod. rapid	sicl till	Fair-poor	70	23	26
594 Reddick	0–1	Black	sicl	Dark gray	cl	Moderately slow	sicl till	Good-very good	100	38	41
294 Symerton	2–8	Very dark brown	sil	Brown	cl	Moderate	sicl till	Good-very good	103	35	44
223 Varna	3–10	Very dark brown	sil	Brown	hv. sicl-sic	Moderately slow	sicl till	Good	80	32	36
141 Wesley	1–2	Very dark brown to black	sl	Gray and brown	sl-scl	Mod. to mod. rapid	sicl till	Fair	75	27	29
Associated soils											
103 Houghton	0–1	Black	muck	Black to very dark brown	muck	Moderate	peat	Good	90	35	...
97 Houghton	0–1	Black to dark brown	mucky peat	Dark brown	peat	Moderately rapid	peat	Fair-good	84	30	...
210 Lena	0–1	Black	muck	Black to very dark brown	muck	Moderate	peat	Good	88	32	...
100 Palms	0–1	Black	muck	Dark brown	muck	Moderate	beavy sl-sic	Good	82	30	...
330 Peotone	0–1	Black	beavy sicl	Very dark gray	beavy sicl	Moderately slow	sicl wash	Good	85	33	31

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Table 13. — Characteristics and Estimated Crop Yields of Soil Association K — Swygert-Bryce-Clarence-Rowe Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields unde bigh level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
235 Bryce	0–2	Black to very dark gray	sic	Dark gray	sic	Slow	sic till or drift	Good	87	34	35
147 Clarence	1–6	Very dark gray to black	sicl	Gray and brown	c	Very slow	c till or drift	Fair	72	28	35
295 Mokena	1–3	Very dark gray to black	sil	Gray and brown	cl	Moderately slow	sic-c till or drift	Good	92	34	42
448 Mona	2–5	Very dark brown	sil	Brown and gray	cl	Moderately slow	sic-c till or drift	Good	88	32	40
230 Rowe	0–3	Black to very dark gray	sic	Gray to olive gray	hv. sic-c	Very slow to slow	c-sic till or drift	Fair	76	30	32
91 Swygert	1–6	Very dark gray to black	sicl	Gray and brown	sic	Slow	sic till or drift	Good	84	31	39
Associated soils											
229 Monee	0–1	Dark gray	sil	Dark gray to olive gray	sic-c	Very slow to slow	sic-c till or drift	Fair	65	24	30
42 Papineau	1–3	Very dark grayish-brown	fsl	Gray and brown	sl-scl	Slow	sic-c till or drift	Fair	66	23	25
238 Rantoul	0–1	Black	sic	Very dark gray	sic-c	Slow to very slow	sic-c wash	Good-fair	75	30	28

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Soil Association K

Swygert-Bryce-Clarence-Rowe Soils

Soil association K occurs in northeastern Illinois on nearly level to strongly sloping uplands. It occupies 776,000 acres or 2.2 percent of the state. This association is composed of three groups of dark-colored soils developed under grass vegetation and underlain by silty clay or clay till or drift.

Mona and Mokena soils have developed from medium-textured material 2 to 4 feet thick on calcareous silty clay drift. Swygert and Bryce soils have developed from less than 2 feet of medium-textured material on silty clay drift that is calcareous at less than a depth of 3 feet. Clarence and Rowe soils have developed from medium-textured material less than 2 feet thick on clay drift that is calcareous at depths of less than 3 feet. Mona and Mokena soils have clay loam subsoils and are moderately slowly permeable above the silty clay drift. Swygert, Bryce, Clarence, and Rowe soils have fine-textured, slowly to very slowly permeable subsoils. See Table 13.

Tile can be used to drain the wetter areas of Mokena, but do not draw satisfactorily in Swygert, Bryce, Clarence, and Rowe soils. Open inlets to tile lines can be used to drain excess surface water from depressions in which the slowly to very slowly permeable Rantoul soils (developed from fine-textured wash) are common. Erosion control measures are somewhat difficult to apply in this association area because short slopes and potholes or depressions are often intermingled on the landscape. Grass waterways are essential because runoff is rather high, caused by slow infiltration, and drainage water tends to concentrate in shallow channels and draws. Because of shallow rooting of farm crops such as corn and soybeans, yield reductions caused by erosion or loss of topsoil are greater than on more permeable soils. This is especially true on Swygert and Clarence soils where it is very difficult to grow field crops after the topsoil has been lost.

Crops respond to limestone, nitrogen, phosphate, and to some extent to potash applications. Corn, soybeans, wheat, and mixed hay are the main crops grown. The moderately and strongly sloping areas that are eroded are best adapted to meadow or pasture crops. Crop yields under a high level of management are moderate to moderately high. Many farms in this area have some livestock.

Soil Association L

Seaton-Fayette-Stronghurst Soils

Soil association L occurs on uplands in northwestern and western Illinois and occupies 2,094,000 acres or 5.8 percent of the state. The soils in this association have developed from thick loess under forest or mixed prairie and forest vegetation and are either light colored or moderately dark colored. The moderately dark-colored soils have developed under mixed forest and prairie vegetation and are generally transitional or intermediate in many characteristics between the dark-colored grassland and the light-colored forest soils. In many respects, soil association L can be thought of as the timbered or forested counterpart of some of the dark-colored, prairie soils in association A. Soil association L occurs over a wider range of slopes than area A, ranging from nearly level on upland divides to very steep along drainageways.

Weakly developed Seaton and Decorra soils have silt loam A and B horizons and are the forested counterparts of dark-colored Port Byron and Joy soils. Mt. Carroll and Fall are intermediate and moderately dark colored. These soils occur in a narrow belt bordering the Mississippi river valley in the western and northwestern part of the state. Moderately developed Fayette, Rozetta, Stronghurst, and Traer soils have silt loam A horizons

Table 14. — Characteristics and Estimated Crop Yields of Soil Association L — Seaton-Fayette-Stronghurst Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to droutb	Estimated average yields under higb level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
61 Atterberry	0–3	Very dark gray	sil	Gray and brown	sicl	Mod. to mod. slow	sil loess	Very good	105	35	45
273 Decorra	2–12	Dark grayish-brown	sil	Brown and gray	heavy sil	Moderate	sil loess	Good-very good	85	29	32
386 Downs	3–7	Very dark grayish-brown	sil	Brown	sicl	Moderate	sil loess	Very good	100	33	40
263 Fall	1–3	Very dark grayish-brown	sil	Brown and gray	heavy sil	Moderate	sil loess	Very good	90	30	38
280 Fayette	3–12	Dark grayish-brown	sil	Brown	sicl	Moderate	sil loess	Good-very good	90	29	38
307 Iona	3–7	Dark grayish-brown	sil	Brown and gray	sicl	Moderate	sil loess	Good-very good	90	30	38
268 Mt. Carroll	2–7	Very dark grayish-brown	sil	Brown	heavy sil	Moderate	sil loess	Good-very good	85	29	32
723 Reesville	1–3	Dark grayish-brown	sil	Gray and brown	sicl	Mod. to mod. slow	sil loess	Good-very good	95	32	38
279 Rozetta	2–12	Dark grayish-brown	sil	Brown and gray	sicl	Moderate	sil loess	Good-very good	92	30	39
274 Seaton	3–15	Dark grayish-brown	sil	Brown	heavy sil	Moderate	sil loess	Good-very good	80	25	26
278 Stronghurst	1–3	Dark grayish-brown	sil	Gray and brown	sicl	Mod. to mod. slow	sil loess	Good-very good	98	33	40
19 Sylvan	7–18	Dark grayisb-brown	sil	Yellowish-brown	sicl	Moderate	sil loess	Good-fair	60	20	28
633 Traer	0–1	Dark grayisb-brown	sil	Gray and brown	heavy sicl	Slow to mod. slow	sil loess	Good-very good	90	28	26
116 Whitson	0–1	Dark grayish-brown	sil	Gray and brown	sicl	Slow to mod. slow	sil loess	Good-very good	90	28	27
Associated soils											
35 Bold	5–25	Brown	sil	Brown and gray	sil	Moderate	sil loess	Fair	48	18	24
282 Chute	10–25	Dark grayish-brown	fs	Pale brown	fs	Very rapid	fs	Very poor	. . .	. . .	. . .
563 Fay	2–6	Dark grayish-brown	sil	Yellowish-brown	sil	Moderate	sand	Good	78	26	27
30 Hamburg	18–45+	Brown	si	Yellowisb-brown	si	Moderately rapid	si loess	Poor	. . .	. . .	. . .
281 Hopper	15–30	Dark grayish-brown	sil	Yellowisb-brown	sil	Moderate	sil loess	Fair	. . .	. . .	. . .
271 Timula	4–15	Dark grayish-brown	sil	Yellowish-brown	sil	Moderate	sil loess	Fair	65	22	24
565 Wysox	3–10	Dark grayish-brown	sil	Yellowish-brown	sil	Moderate	sand	Fair	68	23	25

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of tbis section for requirements for a high level of management.

and silty clay loam B horizons and are the forested counterparts of dark-colored Tama, Muscatine, and Sable soils. Carbonates are usually deeper than 4 feet. Downs and Atterberry are moderately dark colored. Downs is transitional between Tama and Fayette and Atterberry is transitional between Muscatine and Stronghurst. Sylvan, Iona, Reesville, and Whitson soils have thinner solums or A and B horizons and have carbonates at shallower depth (between 2½ and 4 feet) than Fayette, Rozetta, Stronghurst, and Traer. The Sylvan to Whitson drainage sequence of soils has silt loam A and silty clay loam B horizons and, along with Bold soils, are most common in the thick loess bordering the Illinois river valley. These soils also are quite common in association O bordering the Wabash river valley. See Table 14.

Some bottomland soils also occur within the area of association L in stream valleys too small to be shown on the general soil map. Bottomland soils are discussed in association area Z on page 32.

All of the soils in association L have permeable subsoils. Tile can be used for drainage where needed in Atterberry, Reesville, Stronghurst, Traer, and Whitson soils. Most areas of Traer and Whitson soils are small. Erosion control is a problem on the sloping and steep soils in this association. Contouring, terracing, grass waterways, and hay and pasture crops are used as erosion control measures. These soils are deep, permeable, and penetrable by plant roots. Loss of topsoil does not ordinarily reduce crop yields as much as on less permeable soils. Nevertheless, it is economically wise to keep soil losses caused by erosion to a minimum.

Crop yields under a high level of management are high. Crops respond very well to limestone and nitrogen additions and to some extent to phosphate and potash applications. Wheat and legume hay crops especially respond to phosphate applications. Corn, soybeans, wheat, hay and pasture, and oats are the main crops grown. Acreages of oats and hay are highest in the northern part and those of corn, soybeans, and wheat are greatest in the central and southern parts of this association area. Some areas are in forest and produce excellent timber. Mixed grain and livestock farms are common.

Soil Association M

Birkbeck-Ward-Russell Soils

Soil association M occurs on uplands mainly in east-central Illinois with a few small areas in the north-central part of the state. Total extent of association M is 859,000 acres or 2.4 percent of Illinois. These light-colored and moderately dark-colored soils developed under forest or mixed prairie and forest vegetation and occur on nearly level to steep slopes.

Light-colored, moderately strongly developed Birkbeck, Sabina, and Ward soils have formed in 3 to 5 feet of loess on loam to silty clay loam till and are the forested counterparts of dark-colored Catlin, Flanagan, and Drummer soils of association B. They have silt loam A and heavy

Table 15. — Characteristics and Estimated Crop Yields of Soil Association M — Birkbeck-Ward-Russell Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
233 Birkbeck	2–8	Dark grayish-brown	sil	Brown	sicl	Moderate	l-sicl till	Good-very good	90	33	42
496 Fincastle	1–3	Dark grayish-brown	sil	Gray and brown	sicl-cl	Mod. to mod. slow	l till	Good-very good	94	34	43
497 Mellott	3–7	Very dark grayish-brown	sil	Brown	sicl-cl	Moderate	l till	Very good	93	34	43
322 Russell	3–8	Dark grayish-brown	sil	Brown	sicl-cl	Moderate	l till	Good-very good	86	33	40
236 Sabina	1–3	Dark grayish-brown	sil	Gray and brown	heavy sicl	Mod. to mod. slow	l-sicl till	Good-very good	94	34	42
234 Sunbury	1–3	Very dark gray	sil	Gray and brown	heavy sicl	Moderate	l-sicl till	Very good	102	36	44
353 Toronto	0–2	Very dark gray	sil	Gray and brown	sicl-cl	Moderate	l till	Very good	100	35	43
207 Ward	0–1	Dark grayish-brown	sil	Dark gray to grayish-brown	heavy sicl	Mod. slow-slow	l-sicl till	Good	85	30	28
348 Wingate	1–4	Very dark grayish-brown	sil	Brown and gray	sicl-cl	Moderate	l till	Very good	95	35	43
291 Xenia	2–4	Dark grayish-brown	sil	Brown and gray	sicl-cl	Moderate	l till	Good-very good	92	34	41

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

silty clay loam B horizons. Moderately dark-colored Sunbury is transitional in many properties between Sabina and Flanagan soils. Light-colored, moderately developed Russell, Xenia, and Fincastle soils have formed in 1 to 3 feet of loess on till and are the forested counterpart of dark-colored Sidell, Dana, and Raub soils of association B. Russell, Xenia, and Fincastle have silt loam A horizons and silty clay loam upper B and clay loam lower B horizons developed partly in loess and partly in till. Moderately dark-colored Mellott, Wingate, and Toronto soils were developed under mixed prairie and forest vegetation and are intermediate in many properties between Russell and related soils and Sidell and related soils. See Table 15.

Small areas of bottomland soils, which are discussed in soil association Z, and also some stream-terrace outwash soils, which are described in association W, are found within soil association M.

Fertility, erosion control on sloping areas, and drainage on nearly level areas are the major problems on the soils of association M. Crops respond to limestone and nitrogen and to some extent to phosphate and potash applications. Phosphate and potash requirements for good yields are usually moderate. Erosion control is usually provided by contouring, terracing, using grass waterways, or using suitable rotations which include sod crops. The soils of association M are moderately to moderately slowly permeable and have high available moisture-holding capacities. Tile can be used for drainage on nearly level, imperfectly and poorly drained Fincastle, Sabina, Sunbury, Toronto, and Ward soils.

Crop yields under a high level of management are high. Many farms in this area produce livestock as well as grain crops. Corn, soybeans, wheat, oats, and hay and pasture crops are grown. Oats and hay are more common in the northern than in the southern part of this soil association. Some areas are in forest and produce excellent timber. Areas of this association in east-central Illinois often occupy long narrow belts along stream valleys and many farms also have dark-colored soils belonging to soil association B. The light- and dark-colored soils of these two associations are often farmed together. However, the steeper portions of association M are not well adapted to the use of large machinery.

Soil Association N

Clary-Clinton-Keomah Soils

Soil association N occurs on nearly level to very steep, upland areas in northwest-central, west-central, and southwest-central Illinois and occupies 2,888,000 acres or 8 percent of the state. These light- and moderately dark-colored, moderately strongly developed soils have formed in thick loess under forest or mixed prairie and forest vegetation. They are the forested counterpart of dark-colored Ipava and related soils of association A and Herrick and related soils of association D.

Moderately dark-colored Sicily and Clarksdale soils were formed under mixed prairie-forest vegetation and are transitional to Clinton and Keomah, respectively. Well-drained Clary, moderately well-drained Clinton, imperfectly drained Keomah, and poorly drained Rushville soils have silt loam A horizons and heavy silty clay loam to light silty clay B horizons. Sicily is moderately permeable; Clarksdale, Clary, Clinton, and Keomah are moderately slowly permeable; and Rushville is slowly to very slowly permeable. Tile are sometimes used to drain Clarksdale, Keomah, and Rushville, but often a few well-placed ditches serve to remove excess water more satisfactorily. Areas of Rushville are often rather small. Soils such as Hickory, Coatsburg, Elco, Atlas, Fishhook, and Keller, which are derived from Illinoian or Kansan till, are often present on the steeper slopes in soil association N. See Table 16.

Table 16. — Characteristics and Estimated Crop Yields of Soil Association N — Clary-Clinton-Keomah Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
257 Clarksdale	0–2	Very dark gray	sil	Gray and brown	heavy sicl	Moderately slow	sil loess	Very good	98	32	42
283 Clary	4–15	Dark grayish-brown	sil	Brown	heavy sicl	Moderately slow	sil loess	Good-very good	75	25	27
18 Clinton	3–10	Dark grayish-brown	sil	Brown and gray	heavy sicl	Moderately slow	sil loess	Good-very good	80	28	36
17 Keomah	1–4	Dark grayish-brown	sil	Gray and brown	heavy sicl	Moderately slow	sil loess	Good-very good	88	30	35
16 Rushville	0–1	Dark grayish-brown	sil	Gray	hv. sicl-sic	Slow to very slow	sil loess	Good	80	27	25
258 Sicily	2–7	Very dark grayish-brown	sil	Brown and gray	sicl	Moderate	sil loess	Very good	90	30	37
Associated soils											
7 Atlas	10–25	Dark grayish-brown	sil	Gray	sic-hv. sic	Very slow to slow	sic-c till	Poor	...	...	...
660 Coatsburg	7–15	Very dark gray	sil	Gray and brown	sicl-c	Slow to very slow	sic-c till or wash	Poor	50	18	22
119 Elco	7–15	Dark grayish-brown	sil	Brown	sicl	Moderately slow	l till	Fair-good	68	26	30
264 El Dara	12–25	Dark grayish-brown	sl	Brown and gray	cl-c	Slow to moderate	sl-c outwash	Poor-fair	...	...	...
6 Fishhook	10–20	Dark grayish-brown	sil	Gray and brown	hv. sicl-sic	Slow to very slow	sic-c till	Fair	...	...	...
8 Hickory	15–30	Dark grayish-brown	l	Yellowish-brown	cl	Mod. to mod. slow	l till	Good-fair	...	...	...
470 Keller	3–7	Very dark grayish-brown	sil	Gray and brown	hv. sicl-sic	Slow	sic-c till or wash	Fair	65	25	28

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Bottomland soils, which occur in small valleys within soil association N, are discussed under association Z, page 32.

Soils in area N are acid and low in organic matter content. Crops respond well to limestone and nitrogen, and wheat and legumes also respond well to phosphate and potash applications. Limestone and fertilizer requirements are moderately high. Erosion control is needed on the more sloping areas. Contouring, terracing, long rotations including hay or pasture on the sloping areas, and grass waterways are used to control soil losses. The steep and very steep areas are not adapted to cultivation and many are in forest. Trees make good growth and produce good timber on most of these soils with the exception of the fine-textured Atlas, Coatsburg, and Fishhook soils, where timber production is low. On the more level areas, corn, soybeans, wheat, hay and pasture, and oats are produced. Crop yields under a high level of management are moderately high. Mixed livestock and grain farms are common in association N. In many places the less sloping soils in association N are farmed with adjacent dark-colored soils of associations A or D.

Soil Association O

Stookey-Alford-Muren Soils

Soil association O occurs on nearly level to very steep uplands in southwestern, southeastern, and southern Illinois as a belt of thick loess soils bordering the Mississippi, Wabash, and Ohio river valleys. This association occupies 650,000 acres or 1.8 percent of the state.

Table 17. — Characteristics and Estimated Crop Yields of Soil Association O — Stookey-Alford-Muren Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn hu./a.	Soybeans hu./a.	Wheat hu./a.
Major soils											
308 Alford	3–12	Dark grayish-brown	sil	Brown	sicl	Moderate	sil loess	Good-very good	90	29	38
307 Iona	3–7	Dark grayish-brown	sil	Brown and gray	sicl	Moderate	sil loess	Good-very good	90	30	38
454 Iva	0–2	Dark grayish-brown	sil	Gray and brown	sicl	Mod. to mod. slow	sil loess	Good-very good	96	32	42
453 Muren	2–7	Dark grayish-brown	sil	Brown and gray	sicl	Moderate	sil loess	Good-very good	92	30	39
723 Reesville	1–3	Dark grayish-brown	sil	Gray and brown	sicl	Mod. to mod. slow	sil loess	Good-very good	95	32	38
19 Sylvan	7–18	Dark grayish-brown	sil	Yellowish-brown	sicl	Moderate	sil loess	Good-fair	65	20	28
116 Whitson	0–1	Dark grayish-brown	sil	Gray and brown	sicl	Slow to mod. slow	sil loess	Good-very good	85	28	27
Associated soils											
35 Bold	5–25	Brown	sil	Brown and gray	sil	Moderate	sil loess	Fair	48	18	24
30 Hamburg	18–45+	Brown	si	Yellowish-brown	si	Moderately rapid	si loess	Poor	...	...	...
216 Stookey	20–30+	Dark grayish-brown	sil	Brown	heavy sil	Moderate	sil loess	Good	...	...	...
271 Timula	4–15	Dark grayish-brown	sil	Yellowish-brown	sil	Moderate	sil loess	Fair	65	22	24

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

The most extensive soils in association O are moderately developed, well-drained Alford, moderately well-drained Muren, and imperfectly drained Iva. These soils have developed under forest and are light colored. They have silt loam A horizons and silty clay loam B horizons. Light-colored Stookey soils, which have silt loam A and B horizons, occur mainly in a narrow belt along the Mississippi river valley bluffs. Moderately developed Sylvan, Iona, Reesville, and Whitson soils, have thinner solums (A and B horizons) and have carbonates at shallower depths (between depths of 2½ and 4 feet) than Alford and related soils. These soils are common along the Wabash river valley, but not along the Mississippi and Ohio valleys. These light-colored soils have also developed under forest vegetation and have silt loam A and silty clay loam B horizons. Some areas of Hamburg, Bold, and Timula soils are present in association O, but they are not extensive. See Table 17.

Bottomland soils which also occur in small valleys in association O are discussed in association Z on page 32.

All of these soils are permeable and have high available moisture-holding capacities. Tile can be used to drain Reesville, Iva, and Whitson soils, but more commonly a few well-placed ditches are used to remove excess water. Erosion control is needed on the more sloping areas. Contouring, terracing, hay and pasture crops, and grass waterways are used to keep soil losses within limits. Erosion losses do not reduce crop yields as much on these deep, permeable soils as on less permeable soils. Many of the steeper slopes are in forest and produce excellent timber. On some steep slopes, Hickory soils developed from Illinoian glacial till may occur. They also produce good timber. In other places rock outcrops are present.

Fertility is a general problem on the soils of this association. Crops respond very well to limestone and nitrogen, and wheat and legumes respond well to phosphate and potash applications. Corn, wheat, soybeans, and hay and pasture crops are grown. Crop yields are high under a high level of management. In some places, particularly in the southwestern parts of area O, peaches and apples are important crops. Most farms also produce livestock. Dairying is important in the St. Louis area. The proportion of nearly level to moderately sloping land is somewhat greater along the Wabash valley than along the Mississippi valley and, therefore, the eastern part of the association is somewhat better adapted to the use of large machinery. Fruit production could well be expanded on the soils of this association, especially on the better drained soils and in the southern portion where climate is most favorable.

Soil Association P

Hosmer-Stoy-Weir Soils

Soil association P occurs in southwestern, southeastern, and southern Illinois and occupies 2,137,000 acres or 5.9 percent of the state. These light-colored, strongly developed soils formed under forest vegetation from loess 4 to 10 feet thick on Illinoian drift (largely till), or from more than about 7 feet of loess on bedrock residuum. These soils occur on nearly level to very strongly sloping uplands.

Moderately well-drained Hosmer, imperfectly drained Stoy, and poorly drained Weir soils are the major series in this association. These soils have silt loam A horizons and silty clay loam B horizons and are slowly permeable. Hosmer and, to some extent, Stoy have fragipans or siltpans in the lower part of their B horizons which restrict air and water movement and plant root penetration. Thus, even though these soils have high available moisture capacities, plants are not always able to reach and use moisture in the lower horizons. Weir has more clay (medium to heavy silty clay loam) in its B horizon than do Hosmer and Stoy. Under good management, including proper fertilization, plant roots are able to penetrate the B horizon of Weir to considerable depths.

Table 18. — Characteristics and Estimated Crop Yields of Soil Association P — Hosmer-Stoy-Weir Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
214 Hosmer	3–10	Dark grayish-brown	sil	Brown and gray	sicl	Mod. slow to slow	sil loess	Good-fair	70	27	36
164 Stoy	1–4	Dark grayish-brown	sil	Gray and brown	sicl	Slow	sil loess	Good-fair	80	29	38
165 Weir	0–2	Dark grayish-brown	sil	Gray	sicl-hv. sicl	Slow	sil loess	Good-fair	78	28	32
Associated soils											
8 Hickory	15–30	Dark grayisb-brown	l	Yellowish-brown	cl	Mod.-mod. slow	l till	Good-fair	...	...	...
585 Negley	10–20	Dark grayish-brown	sil	Reddish-brown	scl-cl	Moderate	l-cl drift	Fair	65	25	33
15 Parke	7–15	Brown to dark grayish-brown	sil	Reddish-brown	sicl-scl	Moderate	l-cl drift	Good-fair	74	27	36
583 Pike	3–10	Brown to dark grayish-brown	sil	Dark brown	sicl	Moderate	l-cl drift	Good	80	28	37
215 Wartrace	3–10	Dark grayish-brown	sil	Dark brown	sicl	Moderate	sil loess on limestone	Good	82	28	35

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of tbis section for requirements for a bigh level of management.

The fragipan or siltpan in the lower part of the profile of Hosmer (lower one-half of the picture) is dense and slowly permeable, so it restricts root penetration. (Fig. 4)

Hickory soils, which developed from glacial till, are present on many of the steep and very steep slopes in this association. Wartrace soils, which developed from loess over limestone, as well as the Negley, Parke, and Pike soils, which developed from loess over permeable Illinoian drift (mostly outwash), are also present in places but are of minor extent. Also, south of the limit of the Illinoian glaciation rock outcrops are present on many of the very strongly sloping to very steep areas. See Table 18 and Fig. 4.

Bottomland soils which occur in small stream valleys in this area are discussed in association Z on page 32.

Fertility is a major problem on these soils because a rather high investment in limestone and fertilizers is needed for good crop growth. Crops respond very well to limestone, nitrogen, potash, and phosphate with the exception that corn responses to phosphate are usually low. Erosion control is also a problem on the sloping areas. Because of their slowly permeable subsoils, runoff on these soils is rather high and erosion is often serious. Contouring, terracing, long rotations including hay and pasture crops, and grass waterways are needed to control soil losses. On some of the wetter areas of Stoy and on poorly drained Weir, surface ditches or furrows are usually used for drainage. Under a high level of management, crop yields on these soils are moderate. Corn, wheat, hay and pasture, and soybeans are the main crops grown. Many of the steep areas are in forest and produce good timber. Reforestation, including pine plantations, can be used to advantage on many of the steep, eroded areas. General farming, including livestock and grain crops, is common in this area. Tree fruit production is somewhat limited by the slowly permeable subsoils, but some apples and peaches are produced on these soils in places. Improvement of pastures could raise incomes on many farms.

Soil Association Q

Ava-Bluford-Wynoose Soils

The Ava-Bluford-Wynoose soil association occurs in south-central and southern Illinois on nearly level to steep uplands. It occupies a total of 2,989,000 acres or 8.3 percent of the state. These light-colored, strongly to very strongly developed soils have formed under forest vegetation from 1½ to 4 feet of loess on Illinoian drift (largely till) and their B horizons usually extend into the till. These soils have silt loam A horizons and silty clay loam to light silty clay B horizons that are moderately slowly to very slowly permeable.

Moderately well-drained Ava and imperfectly drained Bluford soils have some fragipan or siltpan development in their lower B horizons which restricts the movement of air and water somewhat and hinders deep penetration of plant roots. Poorly drained Wynoose has a very slowly permeable claypan subsoil and drainage must be provided by furrows or open ditches. However, plant roots penetrate the claypan when crops are grown under a high state of fertility. Also included in soil association Q are moderately strongly developed, well-drained Hickory and imperfectly drained Blair soils which have developed primarily from Illinoian glacial till. Hickory and Blair soils occur on moderately sloping to very steep areas. Minor soils in association Q include Racoon and Creal soils which have thicker A horizons (more than 24 inches) and coarser textured B horizons than Wynoose and Bluford. Also included are well-drained Negley, Parke, and Pike soils developed from loess on permeable Illinoian drift. See Table 19.

Bottomland soils that occur in area Q are discussed in soil association Z on page 32.

Fertility, erosion control, and drainage are the major problems on the soils of association Q. Crops respond markedly to limestone, nitrogen, potash, and phosphate applications. Large quantities of these materials are generally needed. These soils have high available moisture

Table 19. — Characteristics and Estimated Crop Yields of Soil Association Q — Ava-Bluford-Wynoose Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
14 Ava	3–7	Dark grayisb-brown	sil	Brown and gray	sicl	Slow-mod. slow	l till	Fair-good	65	25	33
5 Blair	4–12	Dark grayish-brown	sil	Gray and brown	sicl-cl	Slow-mod. slow	cl till	Fair-good	60	21	30
13 Bluford	1–4	Dark grayish-brown	sil	Gray and brown	heavy sicl	Slow	l-cl till	Fair-good	72	27	39
8 Hickory	15–30	Dark grayish-brown	l	Yellowish-brown	cl	Mod.-mod. slow	l till	Good-fair	...	...	...
12 Wynoose	0–2	Dark grayisb-brown	sil	Gray	bv. sicl-sic	Very slow	sicl-cl till	Fair	70	27	35
Associated soils											
337 Creal	1–4	Dark grayish-brown	sil	Gray and brown	sicl	Slow	sil wash	Good-fair	76	28	40
264 El Dara	12–25	Dark grayish-brown	sl	Brown and gray	cl-c	Slow-moderate	sl-cl outwash	Poor-fair	...	...	...
585 Negley	10–20	Dark grayish-brown	sil	Reddish-brown	scl-cl	Moderate	l-cl drift	Fair	65	25	33
15 Parke	7–15	Brown to dark grayish-brown	sil	Reddish-brown	sicl-scl	Moderate	l-cl drift	Good-fair	74	27	36
583 Pike	3–10	Brown to dark grayish-brown	sil	Dark brown	sicl	Moderate	l-cl drift	Good	80	28	37
109 Racoon	0–2	Dark grayish-brown	sil	Gray	sic	Slow	sil wasb-cl till	Fair-good	74	28	37

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

capacities, and under high fertility treatment plant roots are able to penetrate deeper and use more of the available water. Erosion can be controlled on the more sloping areas with contour farming, terraces, long rotations which include hay and pasture crops, and grass waterways. As mentioned above, where drainage is needed it must be supplied by ditches, since tile do not function satisfactorily in these soils. Corn, wheat, soybeans, and hay are the main crops grown in this area. Yields are moderate under high management. Many of the steeper areas are nontillable and are used for pasture or forest. Areas in forest produce good yields, and many of the steep, eroded areas can be profitably reforested. Pine plantations usually do well. Most of this area is used for general farming. A pasture improvement program would add to income on many farms in this area.

Soil Association R

Grantsburg-Robbs-Wellston Soils

Soil association R occurs in southern Illinois and occupies 451,000 acres or 1.2 percent of the state. The main area of these soils is in Johnson, Pope, and Hardin counties, but some small areas are also found on high bedrock knobs to the northeast of these counties. These soils occur on gently sloping to very steep topography, often on narrow ridges bordered by deep ravines.

Moderately well-drained Grantsburg and imperfectly drained Robbs are the main soils on the ridgetops. They are light-colored, strongly to very strongly developed soils formed under forest vegetation from 3½ to 7 feet of loess on bedrock or bedrock residuum. They have silt loam A and silty clay loam B horizons which are slowly to very slowly permeable because of a moderately to strongly developed fragipan or siltpan in their lower part. Zanesville and Wellston (formed in less than 3½ feet of loess on bedrock) and Muskingum (a very thin stony soil) also occur in this association on the steep and very steep side slopes and in the ravines. Many rock outcrops also are present on the steeper slopes. Zanesville, like Grantsburg and Robbs, has a fragipan in its lower subsoil, but it is not as strongly developed as the fragipan in Grantsburg. Wellston and Muskingum do not have fragipans. See Table 20.

Bottomland soils, which are present in the small stream valleys in association R, are discussed in association Z on page 32.

Table 20. — Characteristics and Estimated Crop Yields of Soil Association R — Grantsburg-Robbs-Wellston Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to droutb	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
301 Grantsburg	2–10	Dark grayisb-brown	sil	Brown and gray	sicl	Very slow-mod. slow	sil loess and sandstone	Fair	62	23	32
335 Robbs	0–2	Dark grayisb-brown	sil	Gray and brown	sicl-bv. sicl	Slow to very slow	sil loess and sandstone	Fair	64	25	36
340 Zanesville	7–18	Dark grayish-brown	sil	Strong brown and gray	sicl-cl	Moderately slow	sandstone	Fair	...	...	25
Associated soils											
425 Muskingum	15–30+	Dark grayish-brown	stony sil	Yellowish-brown	stony sil-l	Mod. rapid-mod.	sandstone	Very poor	...	...	...
339 Wellston	12–30	Dark grayisb-brown	sil	Strong brown	sicl	Moderate	sandstone	Fair-poor	...	...	...

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of tbis section for requirements for a high level of management.

A farm pond and improved pasture in soil association R. (Fig. 5)

Fertility and erosion control are the main problems in this association. Crops respond markedly to limestone, nitrogen, potash, and phosphate additions. Large applications of these materials are usually needed. Some corn, wheat, and soybeans are grown in this area. Crop yields under a high level of management are moderate to low, depending on depth to bedrock. Substantial acreages are idle and are growing brush. A pasture renovation and improvement program on the moderately sloping areas and a reforestation program on steep, eroded areas would add considerably to income on many farms. Areas in protected forests produce good yields of timber. Pine plantations usually do reasonably well on these soils. Erosion control is essential to this area. Long rotations with high percentages of hay and pasture crops appear to be most suitable for controlling soil losses and also appear to be most profitable on many farms. Tree fruits, such as apples and peaches, usually do not do well on Grantsburg and Robbs soils because of the dense siltpan in the lower part of their B horizons (Fig. 5).

Soil Association S

Fox-Homer-Casco Soils

The Fox-Homer-Casco soil association occurs in northern Illinois, mainly in McHenry and Lake counties, on nearly level to strongly sloping stream terraces and upland areas. Much of the landscape has a knob and kettle (intermingled knolls and depressions) form. Total extent of this association is 101,000 acres or 0.3 percent of the state. These light-colored soils have formed under forest vegetation from 2 to 3½ feet of medium-textured materials on calcareous gravel, and except for being lighter colored, are similar in many respects to the dark-colored soils of association G.

Well-drained Fox and imperfectly drained Homer are the main soils in association S, but Casco, Dresden, and Matherton (also underlain by gravel at shallow depths) are also present. Silty Pistakee soils are found in depressions and very gravelly Rodman and Stonington soils occur on strongly sloping knobs and terrace breaks. Most of these soils have clay loam to sandy clay loam subsoils. Rodman and Stonington, however, have gravelly to gravelly clay loam subsoils. See Table 21.

Drouthiness, erosion control, and fertility are the major problems on these soils. Because gravel lies relatively near the surface of these soils, they have low available moisture storage capacities. Summer crops such as corn and soybeans often suffer from low moisture supply on these soils. Wheat, barley, and oats are better adapted since they complete growth before the drier and hotter summer months. Most of these soils are rather perme-

Table 21. — Characteristics and Estimated Crop Yields of Soil Association S — Fox-Homer-Casco Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
327 Fox	1–8	Dark grayish-brown	sil	Brown to dark brown	cl	Moderate	gravel	Good-fair	78	27	33
326 Homer	0–2	Dark grayish-brown	sil	Yellowish-brown and gray	cl-sicl	Moderate	gravel	Good	83	30	34
Associated soils											
323 Casco	4–15	Dark grayish-brown	sil	Brown to dark brown	scl-cl	Moderately rapid	gravel	Fair-poor	60	20	25
325 Dresden	1–8	Very dark grayish-brown	sil	Brown to dark brown	cl-scl	Moderate	gravel	Good-fair	82	28	34
342 Matherton	0–2	Very dark gray	sil	Gray and brown	cl	Moderate	gravel	Good	85	32	34
364 Pistakee	0–2	Dark grayish-brown	sil	Dark grayish-brown-brown	sil	Moderate	sil wash	Very good	90	36	35
93 Rodman	7–25	Very dark brown	gl	Light and dark	g	Very rapid	gravel	Very poor	...	...	...
313 Rodman	1–8	Very dark brown	l	Light and dark	g	Very rapid-rapid	gravel	Very poor	...	...	...
253 Stonington	3–10	Dark grayish-brown	l	Brown	gcl	Rapid	g or s	Poor	50	21	25

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

able. Erosion, although a problem, is usually not as serious as on more slowly permeable soils where infiltration is much slower and runoff is higher.

Erosion control measures are hard to apply on the short, rolling slopes. Some of the more gravelly soils in this area do not hold plant nutrients well, thus making it advisable to apply lime and fertilizers more often or for each year's crops. Crops respond to limestone and nitrogen and to some extent to potash and phosphate applications. Yields under a high level of management are moderate to low, depending on the depth to gravel. Corn, oats, wheat, barley, and some soybeans, plus legume hay and pasture are grown. Some of the very gravelly areas are in forest or are idle, but the type of trees and the growth rates of native forests are often not very good. Dairying is the most common type of farming in this soil association.

Soil Association T

McHenry-Lapeer-Pecatonica Soils

Soil association T occurs on uplands in northern Illinois and occupies 209,000 acres or 0.6 percent of the state. These moderately developed, light- and moderately dark-colored soils have developed under forest or mixed forest and grass vegetation from thin loess over permeable till. They occur on nearly level to very strongly sloping topography and many of them are the forested counterparts of the dark-colored soils of association H.

Light-colored Flagg and moderately dark-colored Myrtle soils have developed from 2½ to 5 feet of loess on noncalcareous clay loam to sandy clay loam till. Flagg is the forested counterpart of dark-colored Ogle soils of association H, and Myrtle is transitional between Flagg and Ogle. Light-colored Pecatonica and moderately dark-colored Argyle and Beaver soils have developed from 1½ to 3 feet of loess on noncalcareous clay loam to sandy clay loam till. Pecatonica is the forested counterpart of dark-colored Durand soils of association H, and Argyle is transitional between Pecatonica and Durand. Beaver soils are moderately dark-colored, imperfectly drained associates of Argyle soils. Light-colored McHenry soils have developed from 1 to 3 feet of loess on sandy loam till, which is calcareous at depths of less than 4 feet, and are the forested counterparts of dark-colored Ringwood soils of association H. Light-colored Lapeer soils have developed from less than 1 foot of loess on sandy loam till, which is calcareous at depths of less than 3½ feet, and are the forested counterparts of dark-colored Griswold soils of association H. Light-colored, Westville soils have developed from less than 1½ feet of loess on noncalcareous clay loam to sandy clay loam till. Argyle, Beaver, Flagg, Myrtle, Pecatonica, and Westville soils are most common in the western part of soil association T, and McHenry and Lapeer are most extensive in the eastern part. Minor associated soils in this area include Hennepin, Nippersink, Pistakee, Wallkill, and Washtenaw. See Table 22.

All of the soils in association T are permeable and have moderately high to high available moisture capacities. Crops respond well to limestone, nitrogen, and phosphate. There is some response to potash applications. Yields under a high level of management are moderately high. Corn, oats, legume hay and pasture, wheat, and barley are the most common crops grown. Forested areas produce good timber. Drainage is not a problem in this

Table 22. — Characteristics and Estimated Crop Yields of Soil Association T — McHenry-Lapeer-Pecatonica Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
227 Argyle	2–7	Very dark grayish-brown	sil	Brown to reddish-brown	sicl-cl	Moderate	sl-l till	Good-very good	85	28	35
225 Beaver	1–3	Very dark gray	sil	Brown and gray	sicl-cl	Moderate	sl-l till	Good-very good	89	32	36
419 Flagg	2–10	Dark grayish-brown	sil	Brown to reddish-brown	sicl-cl	Moderate	sl-l till	Good	82	28	33
361 Lapeer	5–12	Dark grayish-brown	l	Dark brown	cl-scl	Moderate	sl till	Fair	70	24	32
310 McHenry	1–6	Dark grayish-brown	sil	Brown	cl-sicl	Moderate	sl till	Good	83	30	38
414 Myrtle	2–8	Very dark grayish-brown	sil	Brown to reddish-brown	sicl-cl	Moderate	sl-l till	Good-very good	87	32	36
21 Pecatonica	2–7	Dark grayish-brown	sil	Brown to reddish-brown	sicl-cl	Moderate	sl-l till	Good	80	26	33
22 Westville	4–12	Dark grayish-brown	sil	Brown to reddish-brown	cl	Moderate	sl-l till	Good	76	25	31
Associated soils											
25 Hennepin	12–30+	Dark grayish-brown	l	Brown	l	Moderate	l till	Fair-poor	...	...	...
299 Nippersink	2–6	Very dark grayish-brown	sil	Brown	cl-sicl	Moderate	sl till	Good-very good	88	32	33
364 Pistakee	0–2	Dark grayish-brown	sil	Dark grayish-brown to brown	sil	Moderate	sil wash	Very good	90	36	35
292 Wallkill	0–1	Dark gray	sil	Dark grayish-brown	sil	Moderate	muck	Good-very good	90	34	32
296 Washtenaw	0–1	Dark gray	sil	Dark gray	sil	Moderate	sicl	Good-very good	93	35	32

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a bigh level of management.

GENERAL SOIL MAP OF ILLINOIS

Legend

DARK-COLORED SOILS

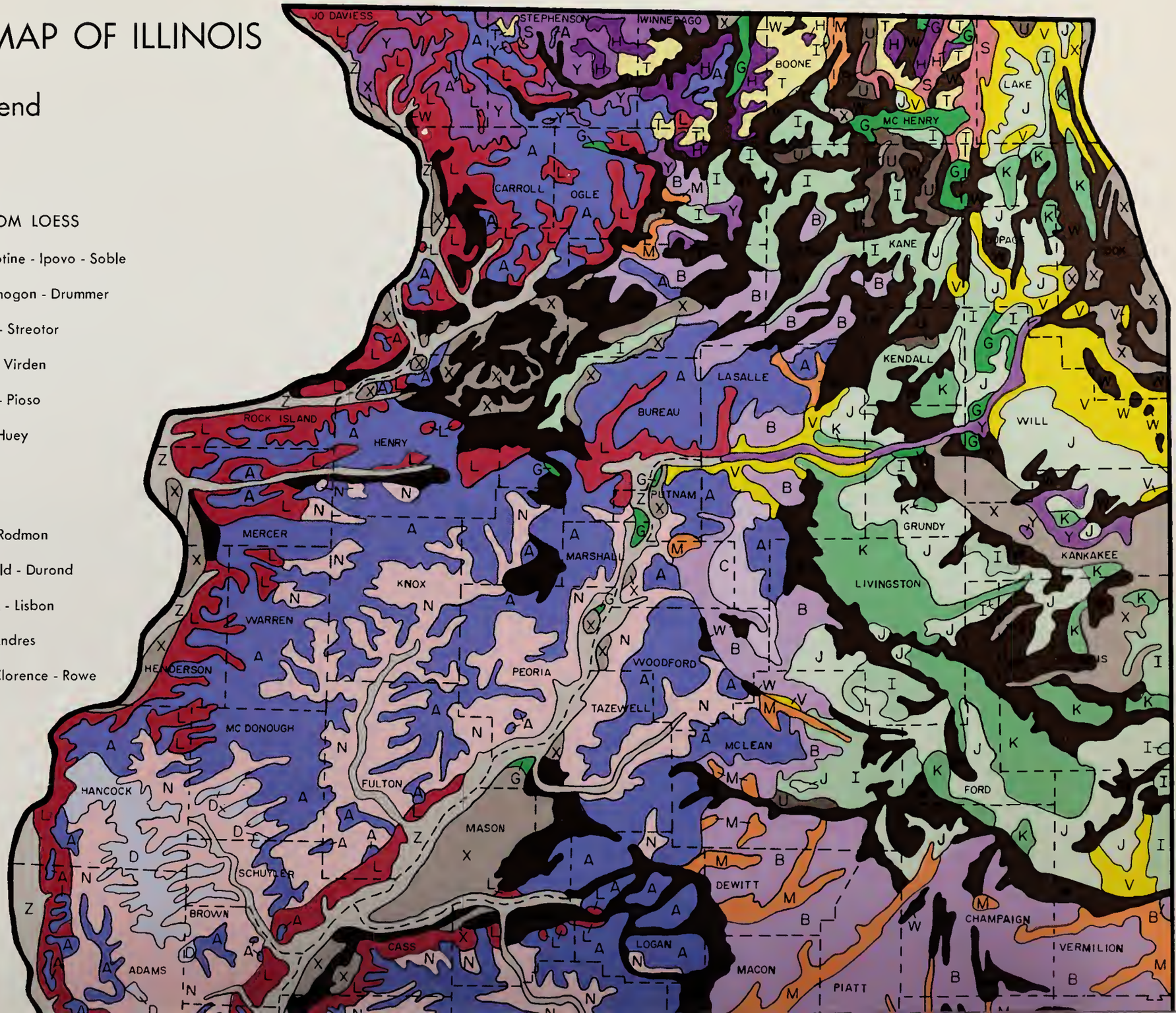
DEVELOPED PRIMARILY FROM LOESS

- A — Joy - Tomo - Muscotine - Ipovo - Soble
- B — Sidell - Cotlin - Flonogon - Drummer
- C — Wenono - Rutlond - Streotor
- D — Horrison - Herrick - Virden
- E — Oconee - Cowden - Pioso
- F — Hoyleton - Cisne - Huey

DEVELOPED PRIMARILY FROM GLACIAL DRIFT

- G — Worsow - Cormi - Rodmon
- H — Ringwood - Griswold - Durond
- I — Lo Rose - Soybrook - Lisbon
- J — Elliott - Ashkum - Andres
- K — Swygert - Bryce - Clorence - Rowe

LIGHT-COLORED SOILS



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1966

Table 23. — Characteristics and Estimated Crop Yields of Soil Association U — Strawn-Miami Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
616 Celina	1–7	Dark grayish-brown	sil	Brown and gray	cl	Moderate	1 till	Good-very good	90	33	36
24 Dodge	1–10	Dark grayish-brown	sil	Brown	sicl-cl	Moderate	1 till	Good-very good	89	32	35
62 Herbert	0–2	Very dark gray	sil	Gray and brown	sicl-cl	Moderate	1 till	Very good	98	34	38
27 Miami	2–10	Dark grayish-brown	sil	Brown	cl	Moderate	1 till	Good-very good	87	31	34
57 Montmorenci	1–4	Very dark grayish-brown	sil	Brown and gray	cl	Moderate	1 till	Good-very good	94	34	39
656 Octagon	2–6	Very dark grayish-brown	l	Brown	cl	Moderate	1 till	Good-very good	90	32	37
617 Otterbein	0–2	Very dark gray	sil	Gray and brown	cl	Moderate	1 till	Good-very good	96	35	40
Associated soils											
25 Hennepin	12–30+	Dark grayish-brown	l	Brown	l	Moderate	1 till	Fair-poor	...	...	...
205 Metea	1–7	Dark grayish-brown	sl	Brown	scl	Mod.-mod. rapid	1 till	Fair	78	28	32
224 Strawn	5–15	Dark grayish-brown	sil	Yellowish-brown	cl	Moderate	1 till	Fair	70	23	26

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

association, but erosion control is needed on the more sloping areas. Slopes are somewhat irregular for contouring and terracing, but grass waterways and rotations containing high percentages of hay and pasture crops are used to reduce soil losses. Dairying and mixed livestock are the most common types of farming in this association.

Soil Association U

Strawn-Miami Soils

Soil association U is of small extent and occurs on nearly level to strongly sloping uplands, primarily in northeastern Illinois. This association occupies 90,000 acres or 0.2 percent of the state. These moderately developed, light-colored and moderately dark-colored soils have formed under forest or mixed grass and forest vegetation from thin loess on loam till and are the forested counterparts of the dark-colored soils of association I.

Light-colored Dodge and moderately dark-colored Herbert soils have developed from 1½ to 3 feet of loess on loam till which becomes calcareous at 2 to 3½ feet deep. Dodge is the forested counterpart of dark-colored Saybrook soils of association I. Light-colored Miami and Celina soils, and moderately dark-colored Octagon, Montmorenci, and Otterbein soils have developed from less than 1½ feet of loess on loam till which becomes calcareous at depths of 2 to 3½ feet. Miami and Celina soils are the forested counterparts of dark-colored Parr and Corwin, respectively, of association I, and Octagon and Montmorenci are the corresponding prairie-forest transitional soils. Otterbein is the imperfectly drained associate of Octagon and Montmorenci. Light-colored Strawn and Hennepin soils, which have developed from calcareous loam till and have carbonates present at shallower depths than most of the other soils in this area, are found on the steeper slopes. Most of these soils have silt loam A horizons and silty clay loam or clay loam B horizons. See Table 23.

These soils are permeable and have high available moisture storage capacities. Tile can be used on Herbert and Otterbein soils where drainage is needed. Erosion control is needed on the more sloping areas. Contouring and terracing conservation practices are sometimes difficult to apply because of short, irregular slopes, but grass waterways and rotations having considerable hay and pasture crops can be used effectively. Crops respond to limestone, nitrogen, and phosphate applications, and to some extent to potash. Fertility needs are usually moderate on these soils and crop yields are moderately high to high under a high level of management. Corn, oats, legume hay and pasture, and soybeans are the main crops grown. Dairy is the most common type of farming, but some mixed livestock farms are also found in this soil association.

Soil Association V

Morley-Blount-Beecher-Eylar (Nappanee)[1] Soils

Soil association V occurs on nearly level to very strongly sloping uplands in northeastern Illinois and occupies 657,000 acres or 1.8 percent of the state. These light-colored and moderately dark-colored, moderately to moderately strongly developed soils, have formed under forest or mixed forest and prairie vegetation in thin, medium-textured material on silty clay loam, silty clay, and clay till or drift.

Light-colored Morley and Blount and moderately dark-colored Markham and Beecher soils have developed

[1] After printing of the general soil map, Eylar was shown to be the same soil as Nappanee. Nappanee is the name that will be used in future publications.

Table 24. — Characteristics and Estimated Crop Yields of Soil Association V — Morley-Blount-Beecher-Eylar Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to droutb	Estimatcd average yields under higb level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
298 Beecher	1–6	Very dark gray	sil	Gray and brown	sic	Mod. slow-slow	sicl till	Good	86	32	38
23 Blount	1–5	Dark grayish-brown	sil	Gray and brown	sic	Mod. slow-slow	sicl till	Good	80	30	35
228 Eylar (Nappanee)	0–6	Dark grayish-brown	sil	Gray and brown	sic-c	Slow to very slow	sic-c drift	Fair	60	25	30
320 Frankfort	1–10	Very dark grayish-brown	sicl	Gray and brown	sic-c	Slow to very slow	sic-c drift	Good-fair	72	27	32
531 Markham	3–8	Very dark grayish-brown	sil	Brown	sic	Mod. slow-slow	sicl till	Good	82	31	37
194 Morley	4–12	Dark grayish-brown	sil	Brown	sic	Mod. slow-slow	sicl till	Good	70	27	32
560 St. Clair	3–15	Dark grayish-brown	sil	Brown and gray	sic-c	Slow to very slow	sic-c drift	Fair	56	22	27
Associated soils											
241 Chatsworth	10–20	Dark grayish-brown	sil	Gray	sic-c	Very slow	sic-c drift	Poor	...	...	...
210 Lena	0–1	Black	muck	Black to very dark brown	muck	Moderate	peat	Good	88	32	...
324 Lena	0–1	Black-brown	peat	Brown	peat	Moderately rapid	peat	Fair	70	25	...

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a bigh level of management.

from less than 2 feet of medium-textured material on silty clay loam till whieh is calcareous at depths between 1½ and 3 feet. Morley and Blount are the forested counterparts, respectively, of dark-eolored Varna and Elliott soils of association J. Markham is transitional between Morley and Varna, and Beecher is intermediate in many properties between Blount and Elliott. Light-eolored St. Clair and Eylar (Nappanee), and moderately dark-colored Frankfort soils have developed from less than 2 feet of medium-textured material on silty elay or clay till or lakebed sediment that is calcareous between depths of 1½ to 3 feet. Eylar (Nappanee) is the forested counterpart of dark-eolored Swygert or Clarence of association K. Frankfort is the prairie-forest transitional soil between Eylar (Nappanee) and Swygert or Clarenee. Beecher, Blount, Markham, and Morley soils have silt loam A horizons and silty clay to heavy silty elay loam B horizons. They are moderately slowly to slowly permeable. Tile ean sometimes be used to drain the wetter areas of Blount and Beeeher soils, but often surface ditehes ean be used to better advantage. Frankfort, St. Clair, and Eylar (Nappanee) have silt loam to silty elay loam A horizons and silty elay to elay subsoils and are slowly to very slowly permeable. Ditehes must be used on these soils where drainage is needed. Chatsworth soils, whieh are developed from silty elay loam to clay drift, are found on the steeper areas and Lena muek or peat is present in some of the deeper depressions. See Table 24.

Morley, Blount, Markham, Beecher, St. Clair, Eylar (Nappanee), and Frankfort soils, all of which have calcareous moderately fine- or fine-textured drift within depths of 3 feet, do not permit deep rooting of annual crops such as corn and soybeans. Therefore, growth of these crops is often more restricted by low available moisture during the growing season than on more permeable till soils. Corn, soybeans, wheat, oats, and hay and pasture are the major crops grown. Oats are most eommonly grown in the northern part of this assoeiation and soybeans are most extensive in the southern part. Crop yields are moderate to moderately low under a high level of management. Forested areas produee fair to good timber. Crops respond to limestone, nitrogen, phosphate, and to some extent to potash applications. Erosion control is needed on the more sloping areas. Because these soils are moderately slowly to very slowly permeable, infiltration is usually slow and runoff is high. Yields of crops are usually reduced markedly by loss of topsoil, especially on St. Clair, Eylar (Nappanee), and Frankfort soils. Contouring and terracing are often diffieult to apply beeause of the short slopes, but hay and pasture crops and grass waterways should be used. Dairying is the main type of farming in the northern part and mixed livestoek and grain are more eommon in the southern part of this assoeiation.

Soil Association W

Littleton-Proctor-Plano-Camden-Hurst-Ginat Soils

Soil assoeiation W occurs in scattered areas throughout Illinois, but is most extensive in northern and central Illinois. Total area is 4,382,000 acres or 12.1 pereent of the state. In general, this group of soils has developed from medium- and fine-textured water-deposited materials, but in places some loess is present above the water-deposited materials and has influenced the soils. The dark-, moderately dark-, and light-colored soils are grouped together on the general soil map and in Table 1, beeause in many areas their pattern of oecurrence is mixed and very complex. Sinee these soils are grouped together in the soil key (Table 1) and the surface color and drainage relationships are readily seen there, these features are not discussed here (Fig. 6).

Light- and dark-colored soils on a stream terrace in soil association W. (Fig. 6)

These soils occur over a wide range of slope — from nearly level to very steep — on upland and stream terrace areas. However, most areas are nearly level to moderately sloping and the steeper areas are usually short, escarpment-like breaks to lower lying alluvial soils. The soils of association W can be grouped according to variations in kind, texture, and thickness of parent materials. These groups are discussed below in the order in which they are given in Table 1.

Batavia, Drummer, Elburn, Kendall, Plano, St. Charles, and Virgil soils comprise the Plano group. They are moderately developed and have formed in 3 to 5 feet of loess on medium-textured outwash or sandy loam till. Most of these soils have silt loam A horizons and silty clay loam B horizons and are deep and permeable. They are highly productive under a high level of management. Moderate fertility applications and erosion control measures are needed. Where drainage is needed, these soils can be tile drained. Corn, soybeans, wheat, oats, and hay are grown.

Alexis, Brenton, Camden, Harvard, Millbrook, Proctor, Sexton, and Starks soils comprise the Proctor group. They are similar to the Plano group discussed above, except that they have developed from thinner loess (less than 3 feet thick) and have more sand in their lower subsoils. The Proctor group is slightly drouthy in dry years because of more sand and less silt and clay in their lower profiles than the Plano group. Nevertheless, crop yields on the Proctor group under a high level of management are moderately high to high. Corn, soybeans, wheat, oats, and hay are grown. Fertility and erosion problems are usually not difficult to overcome. Where tile are used to drain the wetter soils in the Proctor group, care must be exercised to avoid laying tile in or through sandy pockets. The Proctor as well as the Plano group of soils occur mainly in central and northern Illinois.

The Worthen group of soils includes Drury, Littleton, and Worthen, which are weakly developed soils with silt loam A and B horizons. They are most commonly found just below the bluffs bordering the Mississippi, Illinois, and Wabash valleys. These deep, permeable soils are highly productive under a high level of management. Corn, soybeans, wheat, and alfalfa are the main crops grown. Most areas are nearly level to moderately sloping, and erosion, drainage, and fertility problems are easily overcome.

The Marissa group of soils includes Harco, Marissa, Patton, Reesville, and Uniontown, which are moderately developed and have formed from more than 4 feet of silty material, much of which appears to be loess or water-reworked loess. They occur mainly on high terraces in the Wabash valley. These soils have silt loam or silty clay loam A horizons and silty clay loam B horizons. They are permeable soils with carbonates between depths of 2 to 3½ feet, and are highly productive under a high level of management. Fertility, erosion control, and drainage problems are easily overcome. Tile function adequately in the soils of this group that need drainage, but occasionally outlets are a problem. Corn, soybeans, and wheat are the main crops, and cash grain is the main type of farming.

The Colp group of soils is composed of Colp, Denrock, Hurst, Okaw, and Perrot, which are moderately to moderately strongly developed and have formed from less than 2 feet of medium-textured material on lakebed silty clay to clay sediments. Denrock and Perrot occur mainly in the upper Mississippi river valley and Colp, Hurst, and Okaw occur mainly in the Big Muddy and Ohio river valleys. Most of these soils have silt loam A horizons and silty clay to clay B horizons. They are slowly to very slowly permeable and ditches must be used for drainage, because tile do not function satisfactorily. Erosion control is a problem on the steeper areas and conservation practices, such as contouring and terracing, are difficult to apply because of short slopes. Many of the steeper escarpments are used for pasture or forest. Limestone and fertilizer requirements are moderate to high. Corn, soybeans, wheat, and hay are the main crops grown, and yields under a high level of management are moderate to low.

Markland and McGary soils occur mainly on terraces in the Wabash valley. They are similar in many respects to Colp and Hurst soils discussed above, but are not as acid and have carbonates at shallower depths (between 2 and 3½ feet). Crops respond to limestone and nitrogen, and to some extent to phosphate and potash appli-

cations. Crop yields are moderate to low. Ditches must be used for drainage, and steep, eroded slopes are best adapted to hay or pasture production.

Del Rey, Gilmer, Martinton, and Milford comprise the Del Rey group of soils. These soils are moderately developed and have formed from less than 1½ feet of medium-textured material on silty clay loam lakebed sediments which are calcareous between depths of 2½ and 4 feet. These soils occur mainly in northeastern Illinois in glacial lake beds. They have silt loam or silty clay loam A horizons and heavy silty clay loam to silty clay B horizons. They are moderately slowly to slowly permeable and tile can be used for drainage on the wetter soils. Fertility, erosion control, and drainage problems are usually moderate. Corn, soybeans, wheat, oats, and hay are the main crops. Yields under a high level of management are moderate to moderately high. Steep, sharp slopes are often used for pasture.

The Wheeling group is composed of Ginat, Sciotoville, Weinbach, and Wheeling soils. They are moderately developed and have formed from medium-textured sediments 3 to 5 feet thick on loamy material. These soils occur mainly in the Ohio and Cache river valleys, and have silt loam A horizons and silty clay loam to clay loam B horizons. They are similar in color and texture to Camden, Stark, and Sexton soils, but are more acid and tend to have weak fragipan or siltpan development in their lower subsoils. Crops respond to limestone, nitrogen, phosphate, and potash, and yields are moderate under a high level of management. Corn, soybeans, wheat, and hay are grown. Some areas are in forest and produce good timber. Erosion is best controlled on the steep but short slopes by use of hay and pasture crops or trees. Tile are seldom used on the wet soils of this group. Usually open ditches will remove excess water.

LaHogue and Selma soils occur mainly in central and northern Illinois and in the Wabash valley. They are moderately developed soils formed from 3½ to 5 feet of medium-textured material on sand or fine sand. LaHogue and Selma are nearly level to gently sloping, permeable soils which can be tile drained if precautions are taken in laying tile through sandy and gravelly pockets. Erosion is not a problem and fertility requirements are only moderate. These soils are highly productive for grain crops.

Pilot, Tamms, and Thebes soils are moderately developed and have formed from 2 to 3½ feet of medium-textured material or loess on sand or fine sand. These soils occur mainly on high terraces and low uplands along the Illinois river valley where thin loess was deposited over wind-blown sand. Because loose sand is near the surface, these soils tend to be somewhat drouthy and crop yields are moderate to moderately low. Corn, soybeans, wheat, and hay are the main crops grown.

Minor soils occur in many of the soil groups of association W discussed above. See Table 25.

Table 25. — Characteristics and Estimated Crop Yields of Soil Association W — Littleton-Proctor-Plano-Camden-Hurst-Ginat Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
80 Alexis	3–7	Very dark grayish-brown	sil	Brown	sicl-cl	Moderate	sl-l outwash	Good	82	30	36
105 Batavia	1–4	Very dark grayish-brown	sil	Brown	sicl	Moderate	sl outwash or till	Very good	100	34	40
149 Brenton	0–2	Very dark brown to black	sil	Gray and brown	sicl-cl	Moderate	l-sl outwash	Very good	106	36	44
134 Camden	1–7	Dark grayish-brown	sil	Brown	sicl-cl	Moderate	l-sl outwash	Good	85	30	35
122 Colp	4–7	Dark grayish-brown	sil	Brown and gray	sic	Slow	sic-sicl lake-bed mat.	Fair	62	25	32
192 Del Rey	1–3	Dark grayish-brown	sil	Gray and brown	hv. sicl-sic	Slow	sicl lakebed mat.	Good	80	29	35
262 Denrock	0–2	Very dark gray	sil	Reddish-brown and gray	sic	Slow to very slow	sic-c lake-bed mat.	Good-fair	76	27	32
152 Drummer	0–1	Black	sicl	Dark gray	sicl	Moderate	l wash	Very good	102	40	43
75 Drury	2–7	Dark grayish-brown	sil	Yellowish-brown	sil	Moderate	sil wash	Good-very good	90	30	38
198 Elburn	0–2	Very dark brown to black	sil	Gray and brown	sicl	Moderate	sl outwash or till	Very good	112	37	46
341 Gilmer	2–5	Very dark grayish-hrown	sil	Brown and gray	hv. sicl	Moderately slow	sicl lakebed mat.	Good-very good	90	32	36
460 Ginat	0–1	Dark grayish-brown	sil	Gray	sicl-cl	Slow	sl-l outwash	Fair-good	76	27	32
484 Harco	0–2	Very dark gray	sil	Gray and brown	sicl	Moderate	sil wash or loess	Very good	103	36	44
344 Harvard	1–4	Very dark grayish-brown	sil	Brown	sicl-cl	Moderate	l-sl outwash	Good-very good	93	32	38
338 Hurst	1–4	Dark grayish-brown	sil	Gray and brown	sic	Very slow to slow	sic lakebed mat.	Fair	65	26	33
242 Kendall	0–2	Dark grayish-brown	sil	Gray and brown	sicl	Moderate-mod. slow	sl outwash or till	Good-very good	96	34	42
102 LaHogue	0–2	Very dark gray to black	l	Gray and brown	cl	Moderate	sand outwash	Good	90	35	40

Table 25. — Continued

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
81 Littleton	0–2	Very dark brown to very dark gray	sil	Gray and brown	sil	Moderate	sil wash	Very good	105	35	42
176 Marissa	0–2	Very dark gray	sil	Gray and brown	sicl	Moderately slow	sil lakebed mat.	Very good	95	34	40
467 Markland	4–7	Dark grayish-brown	sil	Brown and gray	sic-c	Slow	sic-sicl lake-bed mat.	Fair	63	26	33
189 Martinton	1–3	Very dark gray	sil	Gray and brown	heavy sicl	Mod. slow to slow	sicl lakebed mat.	Good-very good	95	35	40
173 McGary	1–4	Dark grayish-brown	sil	Gray and brown	sic	Slow to very slow	sic lakebed mat.	Fair	66	27	34
69 Milford	0–1	Black	sicl	Dark gray	heavy sicl	Moderately slow	sicl wash or till	Good-very good	94	36	40
219 Millbrook	0–2	Very dark gray	sil	Gray and brown	sicl	Moderate-mod. slow	l-sl outwash	Very good	97	33	41
84 Okaw	0–2	Dark grayish-brown	sil	Gray	sic-c	Very slow	sic-c lake-bed mat.	Poor	60	23	30
142 Patton	0–1	Very dark gray	sicl	Dark gray	sicl	Moderate	sil lakebed mat.	Very good	95	36	40
568 Perrot	0–2	Very dark gray	sicl	Grayish to reddish-brown	sic-c	Very slow	sil-sic lake-bed mat.	Fair	63	24	26
159 Pilot	2–7	Very dark grayish-brown	sil	Brown	sicl	Moderate	sand	Fair-good	80	25	33
199 Plano	1–4	Very dark brown	sil	Brown	sicl	Moderate	sl outwash or till	Very good	105	35	42
148 Proctor	1–4	Very dark brown	sil	Brown	sicl-cl	Moderate	l-sl outwash	Very good	100	34	42
723 Reesville	1–3	Dark grayish-brown	sil	Gray and brown	sicl	Moderate-mod. slow	sil loess or wash	Good-very good	95	32	38
462 Sciotoville	2–5	Dark grayish-brown	sil	Brown and gray	sicl	Moderately slow	sl-l outwash	Fair-good	80	26	34
125 Selma	0–1	Black	l	Dark gray	cl	Moderate	sl-s outwash	Good-very good	95	32	36
208 Sexton	0–1	Dark grayish-brown	sil	Gray	heavy sicl	Slow	l-sl outwash	Good	85	28	33
132 Starks	0–2	Dark grayish-brown	sil	Gray and brown	sicl-cl	Moderate-mod. slow	l-sl outwash	Good-very good	89	31	39
243 St. Charles	1–6	Dark grayish-brown	sil	Brown	sicl	Moderate	sl outwash or till	Good-very good	92	32	40
211 Tamms	1–3	Dark grayish-brown	sil	Gray and brown	sicl	Moderate	sand	Fair-good	76	24	32
212 Thebes	2–7	Dark grayish-brown	sil	Brown	sicl	Moderate	sand	Fair-good	73	22	30
482 Uniontown	1–5	Dark grayish-brown	sil	Brown	sicl	Moderate	sil lakebed mat.	Good	80	26	32
104 Virgil	0–2	Very dark gray	sil	Gray and brown	sicl	Moderate-mod. slow	sl outwash or till	Very good	102	35	42
461 Weinbach	1–3	Dark grayish-brown	sil	Gray and brown	sicl	Slow to mod. slow	sl-l outwash	Good	82	31	38
463 Wheeling	1–7	Dark grayish-brown	sil	Strong brown	sicl-cl	Moderate	sl-l outwash	Fair-good	76	26	32
37 Wortben	2–5	Very dark brown	sil	Brown	sil	Moderate	sil wash	Very good	102	34	40
Associated soils											
732 Argo	0–2	Very dark grayish-brown	sil	Gray and brown	sil	Moderate	sil wash	Very good	94	33	40
188 Beardstown	0–2	Very dark gray	l	Gray and brown	cl	Mod. slow-mod.	sl-l outwash	Good	85	33	36
136 Brooklyn	0–1	Very dark grayish-brown	sil	Gray	heavy sicl	Slow	sl-l outwash	Fair	75	28	32
346 Dowagiac	2–7	Very dark grayish-brown	sil	Dark brown	scl-cl	Moderately rapid	sand	Fair	77	29	32
137 Ellison	1–4	Dark grayish-brown	sil	Yellowish-brown	cl	Mod.-mod. rapid	sand	Fair	73	26	30
469 Emma	1–4	Dark grayish-brown	sicl	Brown and gray	sicl	Moderately slow	sicl	Good	85	28	31
67 Harpster	0–1	Black to very dark gray	sicl	Dark gray	sicl	Moderate	l wash	Good-very good	96	36	39
191 Knight	0–1	Very dark gray	sil	Gray	sicl-cl	Moderately slow	sl-g	Good	78	34	36
265 Lomax	1–4	Very dark brown	l	Dark brown	l-sl	Mod. rapid	ls-s	Fair-good	77	26	29
465 Montgomery	0–1	Very dark gray	sic	Dark gray	sic-c	Slow	sic-c lake-bed mat.	Good	87	32	35
261 Niota	0–2	Very dark gray	sil	Grayish to reddish-brown	sic-c	Very slow	sil-sic lake-bed mat.	Fair	61	23	27
39 Oakford	2–7	Very dark grayish-brown	sil	Brown	sil	Moderate	sil wash	Very good	94	32	38
130 Pittwood	0–1	Black	fsl	Dark gray	cl	Moderate-mod. rapid	sand	Good	85	32	34
206 Thorp	0–2	Very dark gray	sil	Gray and brown	sicl	Mod. slow-slow	sl-l outwash	Good	87	31	36
197 Troxel	0–2	Black	sil	Brown	sicl	Moderate	g and s	Very good	102	37	38
110 Venedy	0–2	Very dark gray	sil	Gray and brown	sicl	Moderately slow	sic lake-bed mat.	Good	84	32	39
26 Wagner	0–2	Very dark grayish-brown	sil	Gray and brown	sic	Slow-very slow	sic-sicl lake-bed mat.	Good	80	30	35
576 Zwingle	2–4	Dark grayish-brown	sil	Grayish-reddish-brown	sic-c	Very slow	sil-sic lake-bed mat.	Fair	67	26	30

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

Many areas of soil association W, especially those that occur on terraces or benches along the major river valleys, are underlain by good sand and gravel aquifers that can be used as sources of well water for irrigation. Many of the well-drained, permeable, silty and loamy soils of this association are well adapted to the production of vegetables and truck crops. However, these crops are important only in areas near large cities such as Chicago and St. Louis.

Soil Association X

Hagener-Ridgeville-Bloomfield-Alvin Soils

Soil association X occurs in six general areas in Illinois and occupies 1,238,000 acres or 3.4 percent of the state. The six general areas are the lower Rock and Green river basins and the upper Mississippi valley, glacial lake Chicago near Lake Michigan, the Kankakee and Iroquois river basins, the Mississippi river valley in Henderson and

Mercer counties, the middle Illinois river valley (largely in Mason County), and the Wabash river valley. The soils of association X are sandy and variable in subsoil development, and occur on nearly level to very strongly sloping topography. Two general groups of sandy soils are present in this association.

Soils in the first group are very sandy and include dark-colored Hagener, Watseka, and Maumee, and light-colored Plainfield and Kilbourne soils, all of which are loamy sands or sands to a depth of 5 feet. Also, the first general group of soils includes dark-colored Ade and light-colored Bloomfield, which have sandy loam to loamy sand lenses between depths of 3 and 5 feet, and thus have greater moisture-holding capacities than Hagener, Plainfield, and related soils.

The second general group of sandy soils, which have developed from sandy loam or fine sandy loam to loam 1½ to 3 feet thick on sand or loamy sand, includes two subgroups. One subgroup includes Dickinson, Hoopeston, Gilford, and Lamont soils, which have sandy loam and loam surfaces with coarse sandy loam B horizons. Soils of this subgroup have greater moisture-holding capacities than Hagener and Ade and their related soils discussed above. Included in the other subgroup of the second general group of sandy soils are dark-colored Onarga, Ridgeville, and Pittwood, and light-colored Alvin, Roby, and Ruark soils. These soils have sandy loam A horizons and heavy sandy loam to light sandy clay loam B horizons and have greater moisture-holding capacities than any of the soils discussed above. A number of minor sandy soils also occur in association X. See Table 26.

Major problems on the sandy soils of association X are drouthiness, fertility, and wind and water erosion. Drainage is also a problem on poorly drained Maumee, Kilbourne, Gilford, and Pittwood. Drouthiness and fertility problems are greatest on the very sandy soils such as Plainfield. Because of their low clay content, the capacities of these sandy soils to hold moisture and plant nutrients are very low. Small grain crops usually do better than corn and soybeans on these soils. Also, such crops as melons and alfalfa are often grown. Fruit such as apples and peaches usually do well once the trees become established. Pine plantations usually do reasonably well. The least sandy soils, such as Onarga and Alvin, have moderate moisture- and nutrient-holding capacities and are often used for general farm crops such as corn, wheat, oats, soybeans, and legume hay and pasture, and yields are moderate under a high level of management.

Crops respond to limestone, nitrogen, phosphate, and potash. Applications must usually be made rather frequently, and on the more sandy soils applications are

Table 26. — Characteristics and Estimated Crop Yields and Soil Association X — Hagner-Ridgeville-Bloomfield-Alvin Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
98 Ade	2–10	Very dark brown	lfs	Yellowish-brown	ls-sl	Mod. rapid-rapid	sand	Fair-poor	69	28	32
131 Alvin	2–7	Dark grayish-brown	fsl	Dark brown	sl-scl	Mod.-mod. rapid	sand	Fair	69	26	29
144 Alvin	2–7	Dark grayish-brown	sl	Dark brown	sl-scl	Mod.-mod. rapid	sand	Fair	66	23	27
53 Bloomfield	2–12	Dark grayish-brown	fs	Strong brown	sl-ls	Mod. rapid-rapid	sand	Fair-poor	65	25	30
87 Dickinson	1–7	Very dark grayish-brown	sl	Dark brown	sl	Mod. rapid-rapid	sand	Fair-poor	70	28	31
201 Gilford	0–2	Very dark gray to black	fsl	Gray or dark gray	sl	Mod. rapid	sand	Fair-poor	75	30	30
88 Hagener	1–7	Very dark brown	ls	Yellowisb-brown	ls-s	Rapid-very rapid	sand	Poor	62	25	28
172 Hoopeston	0–2	Very dark gray	sl	Gray and brown	sl	Mod. rapid-rapid	sand	Fair	75	25	28
237 Hoopeston	0–2	Very dark gray	l	Gray and brown	sl	Mod. rapid-rapid	sand	Fair	78	28	30
203 Kilbourne	0–2	Dark grayish-brown	ls	Gray	ls-s	Rapid	sand	Very poor	..	...	...
175 Lamont	1–7	Dark grayish-brown	fsl	Dark brown	sl	Mod. rapid-rapid	sand	Fair-poor	66	25	30
89 Maumee	0–1	Black to very dark gray	fsl	Gray	ls-s	Rapid	sand	Fair	78	28	29
150 Onarga	1–7	Very dark grayish-brown	sl	Dark brown	sl-scl	Mod.-mod. rapid	sand	Fair	75	26	28
190 Onarga	1–7	Very dark grayish-brown	fsl	Dark brown	sl-scl	Mod.-mod. rapid	sand	Fair	78	28	31
130 Pittwood	0–1	Black	fsl	Dark gray	cl	Mod.-mod. rapid	sand	Good	85	32	34
54 Plainfield	2–15	Dark grayish-brown	s	Yellowisb-brown	s	Very rapid	sand	Very poor	40	...	18
90 Plainfield	2–15	Dark grayish-brown	fs	Yellowish-brown	s	Very rapid	sand	Very poor	45	...	20
151 Ridgeville	1–3	Very dark gray	fsl	Gray and brown	sl-scl	Mod.-mod. rapid	sand	Fair-good	83	33	36
156 Ridgeville	1–3	Very dark gray	sl	Gray and brown	sl-scl	Mod.-mod. rapid	sand	Fair-good	80	30	34
184 Roby	1–3	Dark grayish-brown	fsl	Gray and brown	scl-sl	Moderate	sand	Fair	65	29	35
185 Roby	1–3	Dark grayish-brown	sl	Gray and brown	scl-sl	Moderate	sand	Fair	62	25	32
178 Ruark	0–1	Dark grayish-brown	fsl	Gray	cl-scl	Slow	sand	Fair	60	24	29
49 Watseka	0–3	Black to very dark gray	lfs	Gray and brown	ls-s	Rapid	sand	Poor-fair	71	25	29
Associated soils											
202 Biggs	0–2	Very dark grayish-brown	sl	Gray	ls	Rapid	sand	Poor	60	20	22
332 Billett	1–7	Very dark grayish-brown	sl	Dark brown	sl	Mod. rapid-rapid	sand	Fair-poor	69	27	31
266 Disco	1–6	Very dark brown	sl	Yellowisb-brown	sl	Mod. rapid-rapid	sand	Fair-poor	70	29	32
673 Ebner	2–4	Very dark grayish-brown	fsl	Dark brown	sl-scl	Mod.-mod. rapid	sand	Fair-good	79	32	34
359 Epworth	1–7	Very dark grayish-brown	fsl	Brown	sl-scl	Mod.-mod. rapid	sand	Fair	74	27	30
31 Levan	2–10	Very dark grayish-brown	lfs	Strong brown	sl-ls	Mod. rapid-rapid	sand	Fair-poor	66	26	30
101 Milroy	0–2	Very dark gray	fsl	Gray	cl-scl	Slow	sand	Fair	66	28	30
187 Milroy	0–2	Very dark gray	sl	Gray	cl-scl	Slow	sand	Fair	65	27	30
270 Oquawka	2–10	Very dark grayish-brown	s	Yellowish-brown	s	Very rapid	sand	Poor-very poor	58	18	24
200 Orio	0–2	Very dark grayish-brown	sl	Gray	hv. scl.	Moderately slow	sand	Good-fair	80	32	35

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of tbis section for requirements for a high level of management.

often needed for the immediate crop. Wind erosion is more of a problem on the sands and loamy sands and water erosion is somewhat of a problem on the least sandy soils. Wind erosion can be held within limits by use of cover crops, shelterbelts, sod crops, and incorporating organic matter into the plow layer. Some of the very sandy soils have very active wind erosion which results in "blowouts" that are difficult to stabilize. Reforestation with pine plantations offer the best possibility of bringing the areas with very active wind erosion under control. Water erosion can be controlled on the least sandy soils by use of hay and pasture crops in long rotations. Of the poorly drained soils, Pittwood is one that can be drained by tile if the tile are kept above the sand substratum. Open ditches may also be used. Maumee, Gilford, and Kilbourne soils are too sandy for use of ordinary tile installations. Ditches or perforated pipe with filter material around the pipe are recommended. Care should be taken to prevent lowering the water table too much, thus causing a drouth problem.

Many areas of association X are underlain by reasonably good aquifers and irrigation is a possibility. However, the very sandy soils, because of their very rapid permeability and low moisture storage capacity, usually need excessive amounts of water.

Soil Association Y

Channahon-Dodgeville-Dubuque-Derinda Soils

Soil association Y occurs in northern Illinois and occupies 541,000 acres or 1.5 percent of the state. The main areas of these silty and loamy soils on bedrock are in northwestern Illinois. They occur on gently sloping to very steep uplands. Many of them are on steep side slopes into draws or deep ravines. The other two larger areas are near the Kankakee River in Kankakee County and in the Illinois and Des Plaines river valleys east of La Salle. In the latter two areas, topography is nearly level to moderately sloping. The area in the Illinois river valley is predominantly alluvium on bedrock. The soils of association Y have developed from thin to moderately thick loess or medium-textured drift on either limestone, shale, or sandstone.

Most of the soils are underlain by limestone. Dark-colored Romeo soils lack B horizons and are very thin (less than 1 foot) to limestone. Dark-colored Channahon and its light-colored, forested counterpart, Ritchey, and dark-colored Joliet soils have developed from 1 to 2½ feet of medium-textured material on limestone. They have silt loam or silty clay loam A horizons and silty clay loam to clay loam B horizons.

Dark-colored Plattville and Millsdale have developed from 2½ to 4 feet of medium-textured material on limestone. Plattville has clay loam to silty clay loam B horizons and Millsdale has heavy silty clay loam to silty clay B horizons. Residuum from limestone is seldom if ever present in the above soils, having been removed by glacial or water action. These soils are most common in the eastern portions of association Y. Dark-colored Dodgeville and its light-colored, forested counterpart, Dubuque, have developed from 1 to 2½ feet of loess on less than 1 foot of limestone residuum on limestone bedrock that is found between depths of 1½ and 3 feet. They have silt loam A horizons and silty clay loam B horizons in the loess and silty clay B horizons in the residuum. Dark-colored Ashdale and its light-colored forested counterpart, Palsgrove, are similar in general to Dodgeville and Dubuque, respectively, except that they are thicker soils than Dodgeville and Dubuque because they developed in 2½ to 4 feet of loess. The silty clay loam B horizons of Ashdale and Palsgrove are thicker than those of Dodgeville and Dubuque, but the silty clay B horizons developed in residuum are about the same, and limestone occurs between depths of 3 and 5 feet. Dark-colored Hitt and its light-colored, forested counterpart, Woodbine, have formed in 2½ to 4 feet of loess and noncalcareous clay loam drift on limestone. They have silty clay loam upper B horizons in the loess and clay loam lower B horizons in the drift.

All of the soils above are permeable. They have low to high moisture-storage capacities and crop yields are low to moderately high under a high level of management, depending on depth to bedrock. In general, crops respond well to lime and fertilizers. Corn, oats, and hay and pasture are the main crops grown. Erosion control on the steeper slopes and also on the thinner soils can be accomplished best by the use of hay and pasture crops in long rotations. Contouring and strip-cropping are used on longer slopes, especially in northwestern Illinois. The steep soils and soils closely underlaid by rock are not adapted to cultivation. Forested areas produce good timber, depending on thickness of soil or depth to bedrock.

The soils of association Y, which are underlaid by shale, can be placed into three thickness classes depending on depth to the shale. Light-colored Gosport has developed from less than 1 foot of medium-textured material on shale and has silty clay to clay B horizons. Dark-colored Schapville and its light-colored, forested counterpart, Derinda, have formed in 1 to 2½ feet of loess on shale and have silty clay loam B horizons in the loess and silty clay B horizons in the shale. Dark-colored Keltner and its light-colored, forested counterpart, Eleroy, and dark-colored Loran have formed in thicker (2½ to 4 feet) loess on shale than Schapville and Derinda. Most of the B horizon in Keltner, Eleroy, and Loran is silty clay loam.

Erosion control, fertility, and drainage in areas having sideslope seepage are the main problems on these shale-influenced soils. Most of these soils occur in northwestern

Illinois, in Stephenson and Jo Daviess counties, where contour strip-cropping is used to a considerable extent for erosion control on the more uniform slopes that are not extremely closely underlaid by shale. Grass waterways are also common. The steeper areas closely underlaid by shale are largely in pasture or hay crops. Permeability in the loess-derived portion of these soils is moderate, but it is slow to very slow in that portion of the soil profile developed in shale, and in the underlying shale. Side-hill seepage spots are common and are a problem on many slopes. Usually grass waterways must be used to provide drainage, although some tile are used. Tile are ineffective in the shale, but function satisfactorily in the loess B horizons above the shale. Crops respond well to limestone and fertilizers and yields are low to moderately high under a high level of management. Corn, oats, hay, and pasture are the major crops.

The portion of association Y underlaid by sandstone occurs mainly in Ogle and La Salle counties, and includes moderately dark-colored, very sandy and drouthy Bullard soils, and the dark-colored Hesch and light-colored Boone soils, which have loamy fine sand to fine sandy loam B horizons. Hesch and Boone soils are also drouthy, having formed from 1 to 3½ feet of sandy material on sandstone, but have greater available moisture capacity than Bullard soils. None of these soils is well adapted to cultivation. Crop yields are low because the soils are drouthy and do not hold plant nutrients well. Most areas are in pasture or trees. The sandstone underlying these soils is usually porous and weakly cemented. Considerable areas are underlaid by St. Peter sandstone. A number of minor soils also occur in association Y. See Table 27.

Bottomland soils which occur in small valleys in area Y are discussed in the section on soil association Z below.

Soil Association Z

Lawson-Beaucoup-Darwin-Haymond-Belknap Soils

Soil association Z, consisting of the bottomland soils, occurs in stream valleys throughout Illinois and occupies 2,519,000 acres or 7 percent of the state. Only the larger bottomlands are shown on the general soil map. Many bottomlands too small or too narrow to show on the map occur in other soil associations. The bottomland soils are usually nearly level to gently sloping, although some occur on steeper slopes, especially in the larger bottoms, along slough or old channel banks.

There are three general groups of bottomland soils in Illinois based on their reaction. These three groups are the calcareous soils, the slightly acid to neutral soils, and the acid soils. The acid group of bottomland soils is confined to southern Illinois. The other two groups, the calcareous and the slightly acid to neutral soils, occur throughout the state, although not all of the soils in these two groups are present in all areas. For example, Ware, Riley, Bowdre, Cairo, Newart, Gorham, Petrolia, Darwin, and Karnak soils occur mainly in the southern one-half of Illinois.

The bottomland soils of Illinois vary in color from light to dark, in texture from sandy to clayey, and in natural

Table 27. — Characteristics and Estimated Crop Yields of Soil Association Y — Channahon-Dodgeville-Dubuque-Derinda Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
411 Ashdale	2–7	Very dark grayish-brown	sil	Yellowish-brown	sicl-cl	Moderate	limestone	Good	85	30	36
397 Boone	12–30	Dark grayish-brown	lfs	Brown	lfs	Rapid	sandstone	Very poor	...	...	...
389 Bullard	1–4	Very dark grayish-brown	sl	...	...	Rapid	sandstone	Very poor	...	...	...
315 Channahon	1–8	Very dark grayish-brown	sil	Brown	cl-sicl	Moderate	limestone	Poor	58	26	29
417 Derinda	5–12	Dark grayish-brown	sil	Brown and gray	sicl-sic	Slow	shale	Fair	63	22	25
40 Dodgeville	4–10	Very dark gray	sil	Yellowish-brown	sicl	Moderately slow	limestone	Fair-good	75	33	34
29 Dubuque	7–15	Dark grayish-brown	sil	Yellowish-brown	sicl	Moderately slow	limestone	Poor	43	15	22
547 Eleroy	4–10	Dark grayish-brown	sil	Yellowish-brown	sicl	Moderately slow	shale	Good-fair	70	25	27
551 Gosport	15–30+	Dark grayish-brown	sil	Brown	sic-c	Very slow	shale	Very poor	...	...	...
390 Hesch	1–7	Very dark brown	fsl	Dark brown	fsl-l	Mod.-mod. rapid	sandstone	Fair	75	28	32
506 Hitt	7–12	Very dark brown	sil	Dark brown	sicl-cl	Moderate	limestone	Good-fair	80	32	32
314 Joliet	0–1	Black	sicl	Dark gray	sicl	Moderate	limestone	Fair-poor	61	26	28
546 Keltner	4–10	Very dark grayish-brown	sil	Brown	sicl	Moderately slow	shale	Good	75	28	30
572 Loran	4–8	Very dark gray	sil	Gray and brown	sicl	Moderately slow	shale	Good	80	29	29
317 Millsdale	0–1	Black	sicl	Dark gray	sic	Mod. slow-slow	limestone	Good	80	32	32
429 Palsgrove	5–15	Dark grayish-brown	sil	Dark brown	sicl	Moderate	limestone	Good	75	27	29
220 Plattville	1–3	Very dark brown	sil	Gray and brown	cl-sicl	Moderate	limestone	Good	85	31	36
311 Ritchey	1–8	Dark grayish-brown	sil	Brown	cl	Moderate	limestone	Poor	50	20	26
316 Romeo	0–2	Very dark brown	sil	...	...	...	limestone	Very poor	...	...	...
418 Schapville	5–12	Very dark grayish-brown	sil	Brown and gray	sicl-sic	Slow	shale	Fair	68	25	27
410 Woodbine	5–15	Dark grayish-brown	sil	Dark brown	sicl-cl	Moderate	limestone	Good-fair	72	23	26
Associated soils											
471 Bodine	15–30+	Dark grayish-brown	cherty sil	Brownish-yellow	cherty sil	Rapid	chert	Very poor	...	...	...
511 Dubuque	12–25	Dark grayish-brown	cherty sil	Yellowish-brown	cherty sicl	Slow	limestone	Very poor	...	...	...
413 Gale	7–15	Dark grayish-brown	sil	Yellowish-brown	sicl	Moderate	sandstone	Poor	55	20	23
309 Keytesville	0–2	Dark grayish-brown	sil	Gray	sic-c	Slow to very slow	shale	Very poor	46	18	22
549 Marseilles	2–7	Dark grayish-brown	sil	Brown and gray	sicl	Moderate	shale	Good-fair	71	28	32

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

drainage from poorly drained to well drained. The texture, surface color, degree of development, and the natural internal drainage class, as well as the reaction of individual soils, are listed in the soil key (Table 1). Also see Table 28 for other characteristics and for yields.

Fertility, drainage, overflow, and weed control are the main problems on these soils. On the heavy to very heavy soils (those with silty clay loam to silty clay or clay surface textures) maintenance of good structure or physical condition is also a problem. The fertility needs of the bottomland soils are variable. The acid group, especially, needs limestone for good crop yields. This group needs more phosphate and potash, in general, than the slightly acid to neutral group. The calcareous soils respond to soluble phosphate, but should not have applications of lime. Many of the bottomland soils, especially the lighter colored ones, respond to nitrogen applications. Drainage is needed on the poorly drained soils and to some extent on the imperfectly drained soils. Tile can be used satisfactorily on most of these soils except Wabash, Darwin, Karnak, Bonnie, Cape, Piopolis, and Jacob, all of which are slowly to very slowly permeable. Care must be exercised in tiling bottomland soils (especially such soils as Gorham which are underlaid by sand) to avoid laying tile through sandy pockets or in sand layers that may allow the tile to wash out of line. On many bottomland areas, open ditches are used instead of tile or are used to supplement tile. Overflow is a general problem on

Table 28. — Characteristics and Estimated Crop Yields of Soil Association Z — Lawson-Beaucoup-Darwin-Haymond-Belknap Soils[a]

Soil series No. and name	Dominant slope (percent)	Surface soil		Subsoil			Substratum	Resistance to drouth	Estimated average yields under high level of management (1956 to 1965)		
		Color	Texture	Color	Texture	Permeability			Corn bu./a.	Soybeans bu./a.	Wheat bu./a.
Major soils											
306 Allison	0–2	Very dark grayish-brown	sicl	Brown	sicl	Moderate	sicl-sil	Very good	106	35	41
78 Arenzville	0–2	Dark grayish-brown	sil	Brown	sicl	Moderate	dark sicl	Very good	98	34	40
70 Beaucoup	0–1	Very dark gray to black	sicl	Dark gray	sicl	Moderate	sicl	Very good	96	36	38
124 Beaucoup	0–1	Very dark gray to black	gcl	Dark gray	sicl	Moderate	sicl	Very good	95	34	36
382 Belknap	0–2	Dark grayish-brown	sil	Gray and brown	sil	Moderately slow	sil	Good	85	31	37
334 Birds	0–1	Grayish-brown	sil	Gray	sil	Slow to mod. slow	sil	Good	85	31	36
108 Bonnie	0–1	Grayish-brown	sil	Gray	sil	Slow	sil	Good	80	28	34
589 Bowdre	0–2	Very dark gray	sic	Dark gray	sic-cl	Mod.-mod. slow	ls	Fair-good	83	29	34
422 Cape	0–1	Dark grayish-brown	sicl	Gray to olive gray	sic	Very slow	sic	Fair	72	26	29
71 Darwin	0–1	Very dark gray	sic	Gray	sic-c	Very slow	sic	Fair	77	29	30
239 Dorchester	0–2	Very dark grayish-brown	sil	Brown and gray	sil	Moderate	sil-l	Very good	95	33	35
578 Dorchester	0–2	Very dark grayish-brown	sil rocky sub-stratum	Brown and gray	sil	Moderate	chert and limestone fragments	Good	86	31	35
321 Du Page	0–2	Black	sil	Gray and brown	sil	Moderate	sil	Good	85	30	35
180 Dupo	0–1	Dark grayish-brown	sil	Gray and brown	sil	Moderately slow	dark sicl-sic	Good-very good	91	32	38
162 Gorham	0–1	Very dark gray to black	sicl	Dark gray	sicl	Mod.-mod. slow	sl-ls	Very good-good	98	35	39
331 Haymond	0–2	Dark grayish brown	sil	Brown	sil	Moderate	sil-l	Very good	100	35	42
77 Huntsville	0–2	Very dark brown	sil	Brown	sil	Moderate	sil-l	Very good	106	38	43
85 Jacob	0–1	Dark gray	c	Gray	c	Very slow	c	Poor	45	20	20
28 Jules	0–2	Brown	sil	Yellowish-brown-brown	sil	Moderate	sil	Good-very good	92	33	39
426 Karnak	0–1	Grayish-brown	sic	Gray	sic-c	Very slow	sic-c	Fair	67	24	28
304 Landes	0–2	Very dark grayish-brown	fsl	Dark grayish-brown-brown	fsl	Mod. rapid-rapid	ls-s	Fair	70	25	30
451 Lawson	0–1	Black	sil	Black to very dark gray	sil	Moderate	sil-l	Very good	107	35	43
82 Millington	0–1	Black	l	Very dark gray	l	Moderate	l	Good-very good	90	32	36
161 Newart	0–2	Very dark grayish-brown	sil	Gray and brown	sil	Moderate	fsl	Very good	99	35	42
76 Otter	0–1	Black	sil	Very dark gray	sil	Moderate	sil-l	Very good	98	36	32
288 Petrolia	0–1	Dark gray	sicl	Gray	sicl	Moderately slow	sicl	Good	88	32	34
420 Piopolis	0–1	Grayish-brown	sicl	Gray	sicl	Slow	sicl	Good	80	30	31
74 Radford	0–2	Very dark brown	sil	Black	sicl	Moderate	sicl	Very good	100	36	43
452 Riley	0–2	Very dark grayish-brown	sicl	Brown and gray	sicl-cl	Moderate	fsl-ls	Good	82	30	38
92 Sarpy	0–2	Yellowish-brown	sand	Yellowish-brown	sand	Very rapid	sand	Poor	50	20	24
72 Sharon	0–2	Dark grayish-brown	sil	Brown-dark grayish-brown	sil	Moderate	sil-l	Good-very good	92	32	38
284 Tice	0–2	Very dark grayish-brown	sicl	Gray and brown	sicl	Moderate	sicl	Very good	105	36	42
83 Wabash	0–1	Black	sic	Very dark gray	sic	Slow-very slow	sic-c	Fair	77	28	28
333 Wakeland	0–1	Dark grayish-brown	sil	Gray and brown	sil	Moderate	sil	Good-very good	92	33	38
456 Ware	0–2	Very dark grayish-brown	sil	Yellowish-brown	l	Mod. rapid-rapid	lfs-s	Good	82	31	36
Associated soils											
302 Ambraw	0–1	Very dark grayish-brown	cl	Dark gray	cl	Mod.-mod. slow	cl-sl	Good-very good	90	31	35
427 Burnside	0–3	Dark brown	sil	Dark yellowish-brown	sil	Moderate	sandstone	Fair	70	26	29
590 Cairo	0–2	Black to very dark gray	sic	Gray	sic	Slow	lfs-s	Good	85	31	32
400 Calco	0–1	Black to very dark gray	sicl	Very dark gray	sicl	Moderate	sicl	Very good	93	34	36
475 Elsah	0–3	Dark brown	cherty sil	Brown to dark brown	cherty sil	Mod.-mod. rapid	chert or limestone	Good	85	32	37
248 McFain	0–1	Very dark gray to black	sic	Dark gray	sil-fsl	Slow-very slow	heavy sicl-sic	Good	78	30	31
415 Orion	0–2	Dark gray	sil	Black	sil	Moderate	dark sicl-sil	Good-very good	88	32	33
107 Sawmill	0–1	Black to very dark gray	sicl	Very dark gray	sicl	Moderate	sicl	Very good	105	36	38

[a] See Table 1, footnote 2 for definitions of abbreviations. Refer to the introduction of this section for requirements for a high level of management.

many bottomlands and often it is extremely variable. Levees, diversion ditches to intercept local hill water, clearing trees and brush from stream channels, and other measures are used to prevent or reduce overflow hazards. Fall plowing and use of sod crops in rotations are the principal measures used to promote and maintain good physical condition in the heavy-textured bottomlands. Weeds are often a problem on bottomland soils because the seeds are brought in by floods, but the use of chemicals has helped greatly to solve this problem.

Corn and soybeans are the major crops grown on the bottomland soils, but some wheat, oats, hay, and pasture are also produced (Fig. 7). Some cotton is grown in extreme southern Illinois. Crop yields under a high level of management, including adequate protection from flooding, are moderately high to very high. Some very low-lying, wet areas are in native hardwood forests and produce very high yields of timber and pulpwood.

Although corn and soybeans are the main crops grown in soil association Z, many of the smaller bottomlands are used for pasture. (Fig. 7)

Factors in the Development of Illinois Soils

A number of factors are responsible for the development of Illinois soils. These factors, working in various combinations, include parent material, climate, vegetation, relief and drainage, and time. Man may alter or change some of the above factors by such operations as drainage, clearing, irrigation, cultivation, and fertilization. But in general these practices have not greatly influenced soil development as yet in Illinois except in the cases of excavating and land filling.

Illinois is located in the central or midwestern part of the U.S. between 87.5 and 91.5 degrees west longitude and 37 and 42.5 degrees north latitude. It is in the south-central part of the north-central states and is nearly 400 miles in length from north to south and about 200 miles at its maximum width from west to east. Illinois has lower mean elevation than Indiana, Wisconsin, Iowa, or Missouri. Elevation ranges between 268 feet at the southern tip to 1,241 feet above sea-level at Charles Mound in Jo Daviess County in the northwestern part of the state. Mean elevation is about 600 feet above sea level.

The relative low elevation of Illinois and its location near the confluence of the major drainage lines in the midwest probably influenced the direction and extent of movement of the various ice sheets which moved down from the north during glacial times, and greatly influenced the development of present day soils. The Mississippi River is on the west side of the state, the Ohio River is on the south, the Wabash River is on the southeast, and Lake Michigan is on the northeast. The Illinois River and its tributaries drain much of the central part of the state. As will be discussed later, these rivers were important in the distribution of the loess and outwash soil parent materials in the state. Lake Michigan, in part gouged by glacial action, was the path of one of the major ice lobe invasions during glacial times.

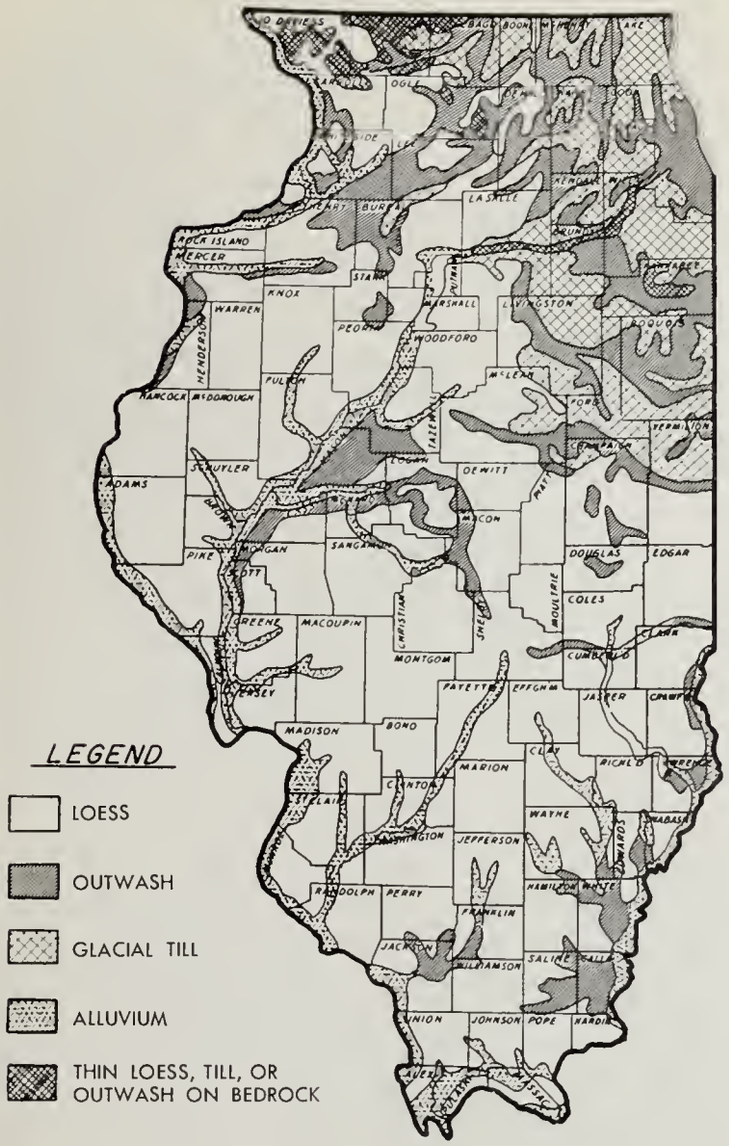
Generally favorable soil parent materials and lack of extreme weathering and soil development since glacial times have resulted in productive soils in Illinois. Good soils coupled with a favorable climate for crop production, a high percentage of nearly level to gently sloping land, and favorable markets have all contributed to rank Illinois high as an agricultural state.

Soil Parent Materials

The parent materials of mineral soils are formed by the disintegration and decomposition of rock. These materials may be moved from place to place by water, wind, or glaciers, and may have been sorted or mixed to varying degrees. Organic soils (peats and mucks) are formed from the remains of plants.

The main parent materials of Illinois soils consist of **loess, outwash, till,** and **alluvium** (Fig. 8). Soil parent materials such as bedrock weathered in place and plant remains or organic matter are of minor extent.

Loess is the most extensive parent material of Illinois soils. Soils developed primarily from loess occur in about one-half of the twenty-six soil associations, occupy about 64 percent of the area of the state, and predominate in the western, central, and southern parts. Loess is a silty wind deposit. During glacial times the melting of the glaciers produced tremendous floods of meltwater which were channeled down the major river valleys — the Mississippi, Illinois, Wabash, and Ohio. During the periods

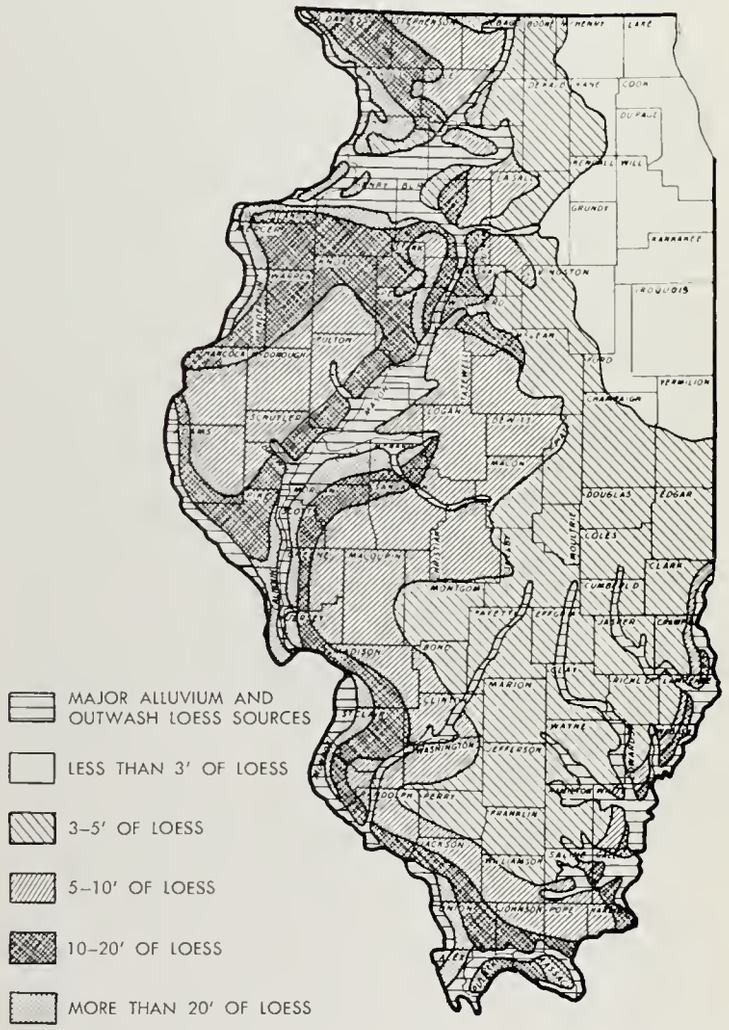


The extent of the main kinds of soil parent materials in Illinois. (Fig. 8)

of low melting when the floodwaters receded, the wind picked up dust from the dry valley floors and deposited it as loess on the uplands. The loess is thickest east of the valleys because of prevailing westerly winds. It is thicker near the valley source areas and thins in a regular manner with distance away from the source. In general, in uniform loess deposits, less weathered, less developed, and more fertile soils are formed in the thicker loess near the source. More highly weathered, more acid, and less fertile soils are formed in the thinner loess that is farther removed from the source areas.

There are at least three main loess blankets in Illinois. The total thickness of the three loess sheets is shown in Fig. 9. The oldest, the Loveland, is present in places in the unglaciated parts of the state, but is covered by the later loess sheets and is of little importance as a parent material of soils. The second or middle loess sheet, the Farmdale (or Roxana), is present in significant amounts near the upper and lower Mississippi river valley, the lower Illinois valley, and the lower Wabash and Ohio river valleys. It is not of great importance directly as a soil parent material because it is also covered by the later Peorian loess. However, in many areas, it adds to the total loess thickness and thus has some influence on the soils which have developed in thin overlying Peorian loess. The Peorian loess, which was deposited during the Wisconsinan glacial period when most of northeastern Illinois was last glaciated, is the main parent material of the loess soils in the state.

The Peorian loess is a good soil parent material. When deposited, it was calcareous and well supplied with plant nutrients (except nitrogen). It was a friable, medium-textured silt loam that had high available moisture-storage capacity. It should be mentioned that in soil associations in which the soils have developed primarily from loess, some areas are included where the loess is absent because of erosion. This is particularly true on steep slopes. In these areas, the soils have formed from

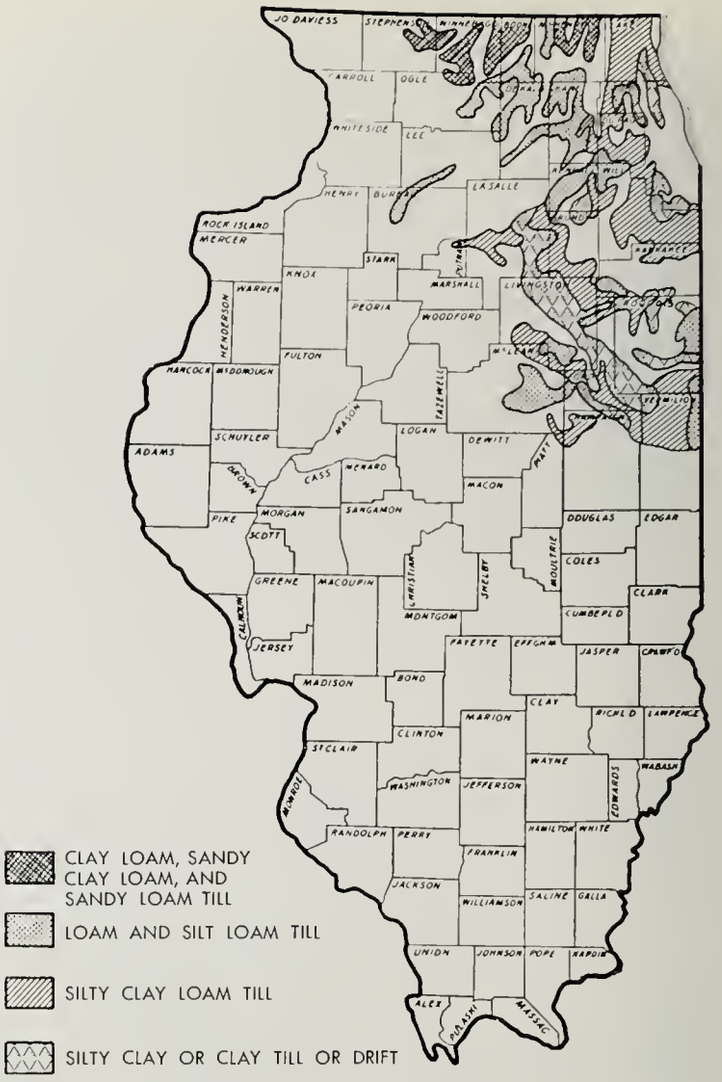


Approximate loess depths (in feet) on uneroded topography in Illinois. (Fig. 9)

glacial till, thin loess on glacial till, or from bedrock or bedrock residuum. Also, in some places, bedrock outcrops on very steep slopes. Many of the other soil associations in the state in which the soils developed primarily from glacial drift or outwash have thin loess covers, so loess has influenced at least the upper part of the profile of many soils outside the predominately loess areas in Illinois.

Outwash materials are important soil parent materials in soil associations G, S, W, and X, which occupy about 16 percent of the area of the state. These materials are most extensive in northern Illinois, but also occur along the Mississippi, Illinois, Wabash, and Ohio river valleys as stream terraces (Fig. 8). Outwash materials in these valleys important to present-day soils were deposited by Wisconsinan glacial meltwaters. They vary in texture from gravel to clay. The coarse gravelly materials were deposited near the glacier fronts or in the upper reaches of the river valleys. Sand was usually carried somewhat farther, depending on the velocity of the running water. The finer materials, such as silt and clay, were deposited in lakes or quiet water in stream valleys. In many places outwash is stratified; that is, it consists of layers of variable-textured material. As with glacial till, described in the following paragraph, the medium-textured outwash is the most desirable outwash parent material. Soils developed from medium-textured outwash compare favorably in crop production with the better loess and till soils.

Glacial till is an important soil parent material in northeastern Illinois. Soils developed primarily from till in soil associations H, I, J, K, T, U, and V occupy about 11 percent of the state (Fig. 8). In northeastern Illinois, the glacial tills are of Wisconsinan age. Older till of Illinoian age, in which a few soils have formed on the steeper slopes, are present throughout much of the rest of Illinois. In western Illinois soils formed from Kansan till, which is older than the Illinoian, are found on some steep slopes. The Wisconsinan tills in northeastern Illinois are extremely variable in texture, ranging from loamy gravel to clay, but including sandy loam, loam and silt loam, silty clay loam, and silty clay (Fig. 10). In general till contains more sand than loess. Also, pebbles and various sizes of boulders are common in till. Most of the Wisconsinan tills in Illinois were deposited by a glacial lobe which was channeled southward through Lake Michigan. The Lake Michigan ice lobe crossed mixed areas of limestone, shale, and sandstone and some igneous rocks. It left a blanket of till of the varying textures mentioned above in a mixed pattern. The till textures and, consequently, the soils developed from the till often change over short distances. The medium-textured tills, especially loams and silt loams, are good soil parent materials. The other tills become progressively less desirable as soil parent materials as they become either coarser or



The textures of parent materials of glacial till soils in northeastern Illinois. (Fig. 10)

finer in texture. The tills were calcareous and well supplied with plant nutrients, except nitrogen and possibly phosphorus, when deposited. In general, they have considerably lower available moisture-storage capacities, higher bulk densities, and are more compact than loess.

Alluvium includes the recent sediments deposited by streams on their floodplains. It is the main soil parent material in soil association Z which occupies about 7 percent of the state. Alluvium occurs throughout Illinois in stream valleys. Because of greater dissection and older, more mature, and wider valleys, it is most extensive in southern Illinois. Most of the small valleys or alluvial areas in the state are not shown on the general soil map because of its small scale.

Alluvial sediments in Illinois vary in reaction from acid to calcareous, in color from light to dark, and in texture from sands to clays. The acid alluvial sediments occur in southern Illinois and the slightly acid to neutral and the calcareous sediments occur primarily in the central and north, but are found throughout the state. Medium-textured alluvial sediments predominate. The smaller

stream valleys usually have silty or loamy sediments, and the moderately fine- and fine-textured sediments are found mainly in the larger bottomlands along the Mississippi, Illinois, Wabash, and Ohio rivers.

Bedrock weathered in place to form soils is of minor extent in Illinois. Areas of these kinds of soils are most important on steep slopes in the unglaciated sections in northwestern Illinois and in extreme southern Illinois. Very often the residual soils have been eroded in the geologic past and now have upper horizons formed in later deposited materials. Soils formed from thin loess, till, or outwash on various kinds of bedrock are most extensive in soil association Y, which occupies about 2 percent of the state.

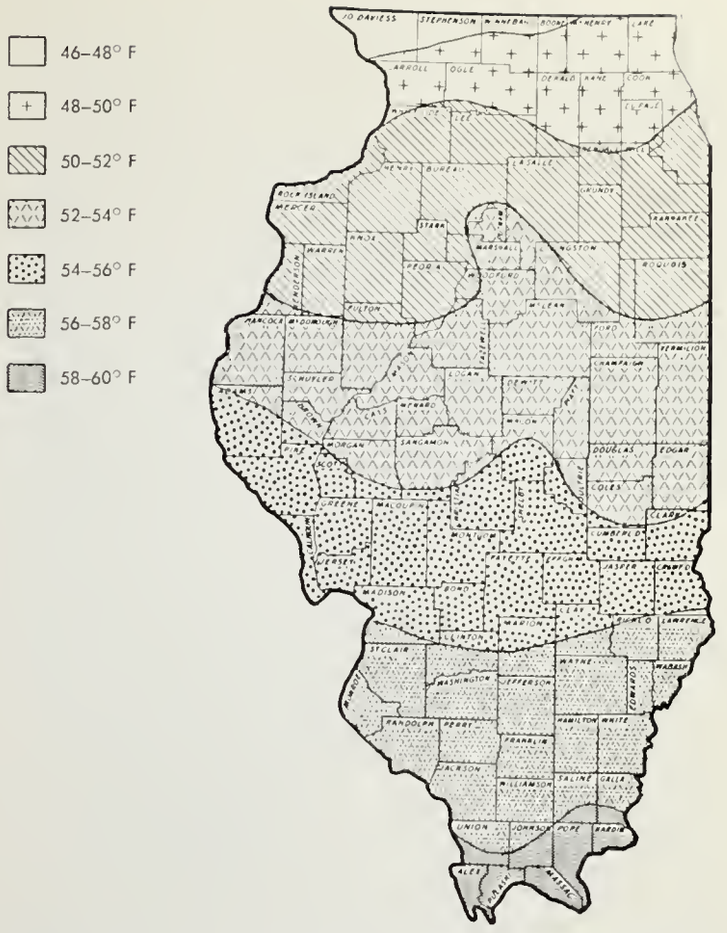
Organic remains of plants as soil parent materials are also of minor importance in Illinois and occur mainly in extreme northeastern Illinois with a few areas found in some of the major river valleys. Mucks and peats are the main soils formed from the decay of plant remains. They are very high in organic matter. Muck is more decomposed than peat.

Climate

Climate is an important factor in soil development and is responsible for many soil differences. Climate largely determines the type of weathering that takes place in an area and also influences the type of vegetation that grows on soils. The humid, temperate climate of Illinois is conducive to the breakdown of soil minerals, the formation of clay, and the translocation or movement of these materials downward in the soil profile. Materials such as clay tend to be removed from A horizons and accumulate in B horizons. This is why B horizons or subsoils are usually heavier textured than A horizons in soils developed in uniform parent materials.

Temperature and rainfall are the major components of climate and the effects of these two factors are often closely related. In general clay formation increases with increase in temperature and rainfall, but so does clay destruction. At the present time there is evidence to indicate that there is a zone of maximum clay accumulation in soils through central Illinois. In northern Illinois, the rate of clay formation is less and in southern Illinois the rate of clay destruction and movement downward from the B horizon appear to be greater than the present rate of clay accumulation. These relationships are likely to change with geologic time and advanced weathering of soils. In general, chemical weathering is more intense in humid, warm climates and physical weathering is more important in dry climates.

The nature of the climate of Illinois during the development of our soils is difficult to characterize. Best evidence seems to indicate that it was not greatly different from present-day climate, except for a rather warm, dry period some 4,000 to 6,000 years ago.

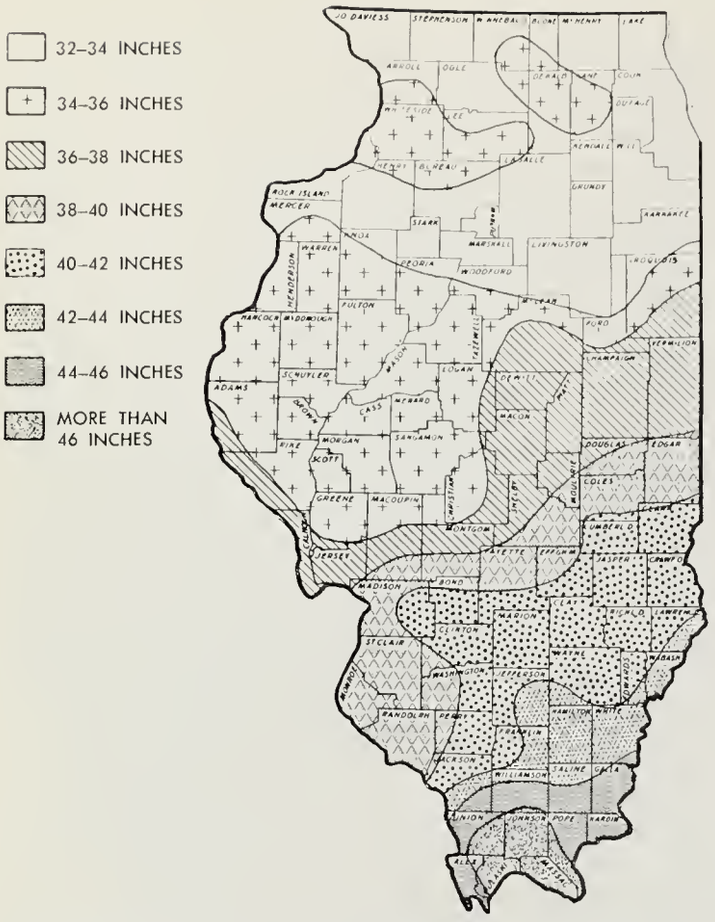


Average annual temperature (degrees Fahrenheit) in Illinois, 1931 to 1960. (Data from U.S. Weather Bureau.) (Fig. 11)

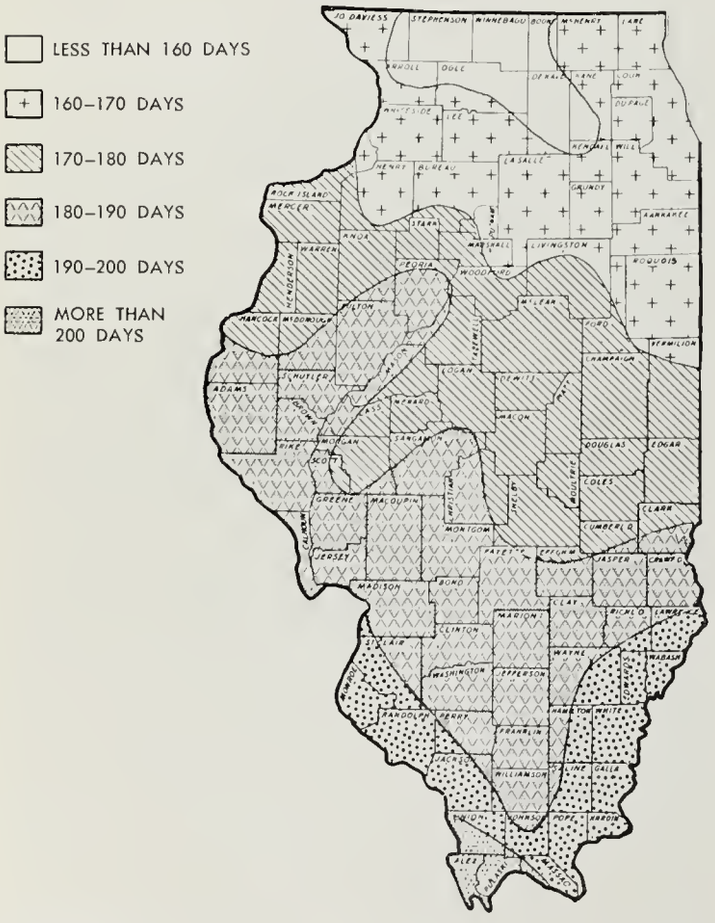
Present climate in the state is of the continental type with hot summers and cold winters. Average annual temperature ranges from about 47° F. in the north to 59° F. in the south (Fig. 11). January is normally the coldest month with mean temperature ranging from about 22° F. in the north to 36° F. in the south. Mean temperature in July (usually the hottest month) ranges from about 73° F. in the north to 80° F. in the south. The latitudinal extent of the state from 37 to 42.5 degrees north is largely responsible for these temperature variations.

Average annual precipitation in Illinois ranges from about 32 inches in the north to 47 inches in the south (Fig. 12). Although total precipitation is greatest in southern Illinois, that which falls during the growing season (April to September) is about the same throughout the state. Less distance to the Gulf of Mexico and more cyclonic activity in winter in southern Illinois are responsible for higher winter and early spring precipitation in that part of the state.

The average number of frost-free days in Illinois ranges from less than 160 in the north to more than 200



Average annual precipitation (inches) in Illinois, 1931 to 1960. (Data from U.S. Weather Bureau.) (Fig. 12)



Average number of frost-free days in Illinois. (Data from Ill. Bul. 532.) (Fig. 13)

in the south (Fig. 13). Although the growing season is shorter in northern Illinois, crop varieties and corn hybrids with shorter maturity periods are used in this part of the state, and frost damage is usually not a serious problem.

Vegetation

Vegetation as a factor in the development of soils refers primarily to the native vegetation under which the soils formed. The two main types of native vegetation which influenced Illinois soils are grass or prairie and trees or forest. The climate of Illinois is conducive to the growth of forest, but most of the state had prairie vegetation at and for some time previous to settlement (Fig. 14). Approximately 55 percent of the state had prairie and 45 percent had forest vegetation at the time of settlement. In central and northern Illinois in areas where prairie vegetation predominated, forests were large confined to the better drained, more rolling areas bordering stream valleys.

Native vegetation in Illinois. (Fig. 14)

Soils formed under grass are normally dark colored and high in organic matter content unless they are highly weathered and strongly developed. On the other hand, soils formed under trees or forest vegetation in Illinois are light colored and usually low in organic matter content. Similar types of soil weathering occur under prairie and forest vegetation, but soil development is more intense under forest in climates such as that of Illinois. Although the largest area of the soils of Illinois was formed under grass, it is evident that at the time of settlement, forest vegetation was encroaching on the prairies. Along the prairie-forest border, it is common to find moderately dark-colored soils under forest vegetation. In these areas the forest had not been present for sufficient time to entirely change soil features imparted by a previous grass or prairie vegetation.

Other living matter besides vegetation that influences soil development includes various kinds of animal life such as earthworms, crawfish, ground squirrels and other burrowing animals, and various insects which incorporate organic matter into the soil and mix soils to varying depths and degrees.

Relief and Drainage

In most parent materials under given climatic conditions, relief largely controls the moisture status of soils. Relief in reference to soil genesis is composed of elevation, topography or lay and slope of the land, and water table levels. As mentioned on page 34, mean elevation of Illinois is about 600 feet above sea level. Highest and most rolling areas are in northwestern and southern Illinois. Counties with the highest percentages of nearly level land are in the central part of the state. Topography influences the amount of infiltration, the amount of runoff and drainage water, and the amount of erosion.

The amount of moisture in the soil during its development affects the rate of weathering and the development of soil colors. So colors are a reflection of the moisture status during soil development. Well-drained soils have uniform brownish or yellowish-brown colors in their subsoils, and poorly drained soils have grayish subsoils. Imperfectly (or somewhat poorly) drained soils have mottled yellowish, brownish, and grayish subsoils. Water table levels are usually highest in depressional and nearly level-lying, poorly drained areas and lowest in rough or rolling, well-drained areas.

In uniform soil materials, such as loess, differences in natural soil drainage are usually closely associated with slope. The shape, direction, and length of slope also affect soil development. Convex slopes usually shed water faster than concave slopes and therefore tend to be drier. Slopes facing south are drier than slopes facing north, because those facing south are more directly exposed to the sun. On long slopes, wash from the upper portion is often added as colluvial material to the lower portion.

Time

Time as a factor in soil development cannot be measured strictly in terms of years, because the time needed for a particular soil to develop depends on the other factors of soil formation. Soil development is more rapid in humid climates that support a good growth of vegetation than in dry climates. Leaching of plant nutrients and materials including limestone is more rapid in coarse-textured, permeable parent materials than in fine-textured, slowly permeable materials. An acid soil develops much faster in materials low in limestone than in materials high in limestone. On steep slopes soils may be very thin and youthful or weakly developed, even though they have been exposed to weathering for very long periods of time, because erosion removes the soil nearly as fast as it is formed. However, on stable landscapes, soils tend to be more strongly developed, more highly leached, and have stronger differentiation of horizons with increased time of exposure to weathering processes.

Most of the soil parent materials of Illinois, except rock residuum which is older, were deposited during Pleistocene or glacial times. The Peorian loess, most of the outwash, and the glacial tills of the northeastern part of the state were deposited during the Wisconsinan glacial stage which receded from Illinois some 12,000 years ago. Most of the soils of Illinois have developed during and since Wisconsinan times.

Major Soil Groups in Illinois

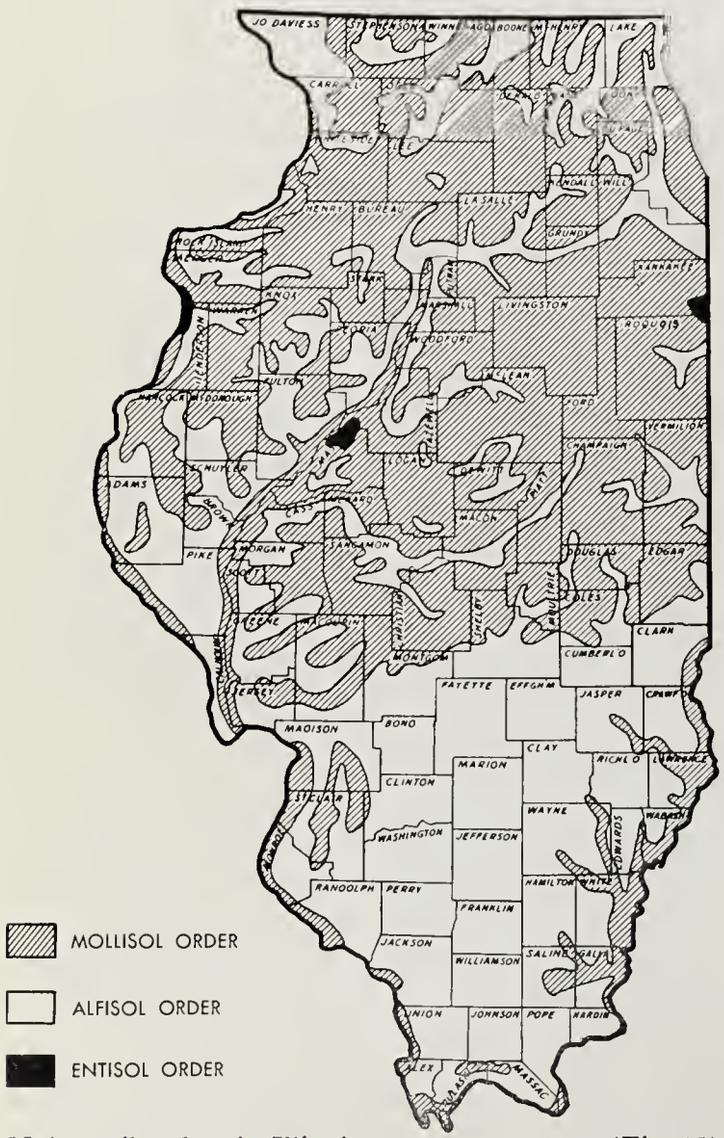
Soils may be grouped in a wide variety of ways depending on the characteristics or properties on which the groupings are based and on the uses to be made of the groups. In soil classification, soils are grouped on the basis of properties at various levels or categories ranging from the individual kinds of soils or soil series (which are given place names such as Muscatine, Flanagan, Elliott, or Cisne at the lowest and most detailed level) to soil orders at the highest and most generalized level.

There are 10 orders or major soil groups in the soil classification system. These 10 orders are believed to include all of the soils of the world. The soil orders are separated from each other on the basis of several critical horizons whose presence gives a key to the main soil-forming processes that have been active or whose absence indicates a lack of development. Thus soils that have undergone similar development and have similar kinds of horizons tend to be grouped in the same order. For

example, most (but not all) soils with thick dark-colored A horizons are grouped into the Mollisol order as discussed below. As another example, soils which lack distinctive horizons, such as recently deposited alluvial soils, are grouped into the Entisol order.

Between the soil order and soil series, there are four other categories or levels at which soils are grouped. These four categories include: the suborders or subdivisions of the orders; the great groups; then the subgroups; and finally soil families, the category or level just above soil series.

Only five of the 10 soil orders or major groups are important in Illinois. These five soil orders are the Mollisols, Alfisols, Inceptisols, Entisols, and Histosols. The first two groups, the Mollisols and the Alfisols, are by far the most extensive in the state. The distribution and extent of three of the five major soil groups or soil orders in Illinois (Mollisols, Alfisols, and Entisols) are shown in Fig. 15. The five groups are discussed briefly below as they are found in the state. Areas of the Inceptisols and Histosols are generally small and could not be shown at the scale used in Fig. 15.



Major soil orders in Illinois. (Fig. 15)

Mollisols

The Mollisols in Illinois are the dark-colored soils formed under grass vegetation, although some of them on the major river floodplains had a forest or mixed forest and grass vegetation at the time of settlement. The thick, dark surface layer of the Mollisols was formed by the decomposition of underground vegetative remains consisting mostly of roots, but also including surface vegetation that has been incorporated in the soil by animal life such as earthworms and various burrowing animals. Not only must the surface layer of Mollisols be dark colored and average more than 1 percent organic matter throughout, but the dark-colored layer must be at least 10 inches thick, unless the total soil is very thin, and it must have sufficient soil structure so that it is not both massive and hard or very hard when dry. The dark-colored layer and also the B horizon must have a base saturation of more than 50 percent with calcium as the predominant base. The Mollisols may vary widely in texture, permeability, degree of subsoil development, and many other properties.

As shown in Fig. 15, most of the Mollisols occur in central and northern Illinois. In southern Illinois they are confined largely to the floodplains and some of the terraces of the major rivers. The Mollisols shown in the river valleys in Fig. 15 include some areas of Entisols and Inceptisols which were too small to show separately on the small scale map. Mollisols occupy about 49 percent of the state.

Alfisols

The Alfisols in Illinois are, in general, the light-colored soils formed under forest vegetation. The major exceptions are Cowden and related soils of soil association E and Cisne and related soils of association F. Both of these soil groups formed under grass vegetation, but have surface soil layers which are too thin, too light colored, or too low in base saturation to be grouped with the Mollisols. Low base saturation in the B horizon may also exclude some of these soils from the Mollisols.

The Alfisols have light-colored surface layers, or, if the surface layer is dark, it is less than 10 inches thick. These surface layers must also have less than 1 percent average organic matter content throughout their total thickness. The Alfisols must have a recognizable B horizon of clay accumulation which has base saturation of more than 35 percent at a depth of 50 inches below the top of the B horizon.

The Alfisols predominate in southern Illinois, but are present throughout the state (Fig. 15). In central and northern Illinois they are confined largely to the more rolling, better drained sites bordering stream valleys or to the drier morainic positions. Alfisols occupy about 46 percent of the state.

Inceptisols

The Inceptisols include soils that have weakly developed horizons. They lack the thick, dark-colored surface layer of the Mollisols and the B horizon of clay accumulation of the Alfisols. They do have some recognizable horizons or show evidence of the beginning of horizon development and thus differ from the Entisols. Changes in the material or horizon development may have taken place in relatively short periods. Such things as leaching of carbonates, oxidation or reduction of iron compounds, or the formation of structure have taken place.

The Inceptisols of Illinois include light-colored bottomland soils, such as Bonnie, in which the B horizon zone is gray because of reduction of iron. Also included are light-colored upland soils, such as Timula, that occur on steep slopes and that have been leached of some carbonates and have some structure development, but lack clay-accumulation B horizons. Also listed as Inceptisols are other light-colored youthful soils, such as Drury, which are leached of carbonates and have structure, but lack clay-accumulation horizons because they have not been in place long enough. Inceptisols are estimated to occupy about 3 percent of Illinois.

The Inceptisol areas are included with the Mollisol areas in the bottomlands and with the Alfisols in the uplands in Fig. 15. Inceptisol areas are often small or narrow and could not be shown separately at the scale used in Fig. 15.

Entisols

The Entisols lack distinctive horizons. In Illinois the Entisols include the better drained, recently deposited alluvial soils which have not been in place long enough to develop recognizable horizons, although a darkened plow layer may be present. They also include a few very sandy soils which lack sufficient weatherable minerals to form recognizable horizons. Some Entisols may have buried surface horizons of former soils if the top of the buried soil is deeper than 20 inches. Thus a soil is classified as an Entisol, if recent alluvium has accumulated to a depth of more than 20 inches over a former soil.

The Entisols occur throughout Illinois along streams, often in a natural levee position, and also in very sandy areas where soils such as Plainfield predominate. Also a few Entisols, such as Hamburg and Bold, occur on steep slopes where geologic erosion has limited soil development. Some areas along streams are narrow and are included with the Mollisols of the stream valleys in Fig. 15. The few areas of Entisols shown in Fig. 15 are the very sandy soils. Entisols are estimated to occupy about 1.5 percent of the state.

Histosols

The Histosols include the organic soils — the peats and mucks. These soils are formed from the remains of plants. Mucks are more thoroughly decomposed than peats. These soils are wet unless artificially drained and contain high amounts of organic matter. The exact amount of organic matter in the Histosols varies with the amount of clay in any mineral matter which may be mixed with the organic remains. In general, the Histosols contain much more organic matter than the Mollisols in Illinois. Organic matter content of Histosols is generally 14 percent or more.

The Histosols occur mainly in extreme northeastern Illinois, but some scattered areas are present in various counties in the northern half of the state. Areas of Histosols are too small to show on the small scale map in Fig. 15. They are estimated to occupy about one-half of one percent of the state.

Progress of Soil Surveys in Illinois

For most users, soil surveys include two essentials: (1) a soil map showing the location and extent of the various soil types on a suitable base map of the area, and (2) a soil report which gives the description and properties of the soils and includes an interpretation of their characteristics for various purposes and uses, such as agriculture, engineering, and woodland.

Soil surveys have been made in Illinois since 1902. In the period since 1902, soil survey techniques and skills have been developed and improved. This has resulted in more accurate and more detailed soil maps on larger scales and more comprehensive soil reports on the characteristics and interpretations of the soils.

The status of soil survey maps and reports for Illinois as of 1966 is shown in Fig. 16. The maps and reports are grouped into five classes based on their usefulness.

There are eleven counties in the first group in which the soils have been mapped and the soil reports are being prepared for publication. The soils were mapped on aerial photographs at a scale of 4 inches per mile. Slope and erosion conditions, as well as soil types, are shown. The counties in this group are Alexander, Carroll, Douglas, Edwards, Gallatin, Lake, La Salle, Montgomery, Pulaski, Richland, and Stephenson. Surveys of Alexander and Pulaski counties are to be combined into one report. Also the surveys of Edwards and Richland counties will be published in one report.

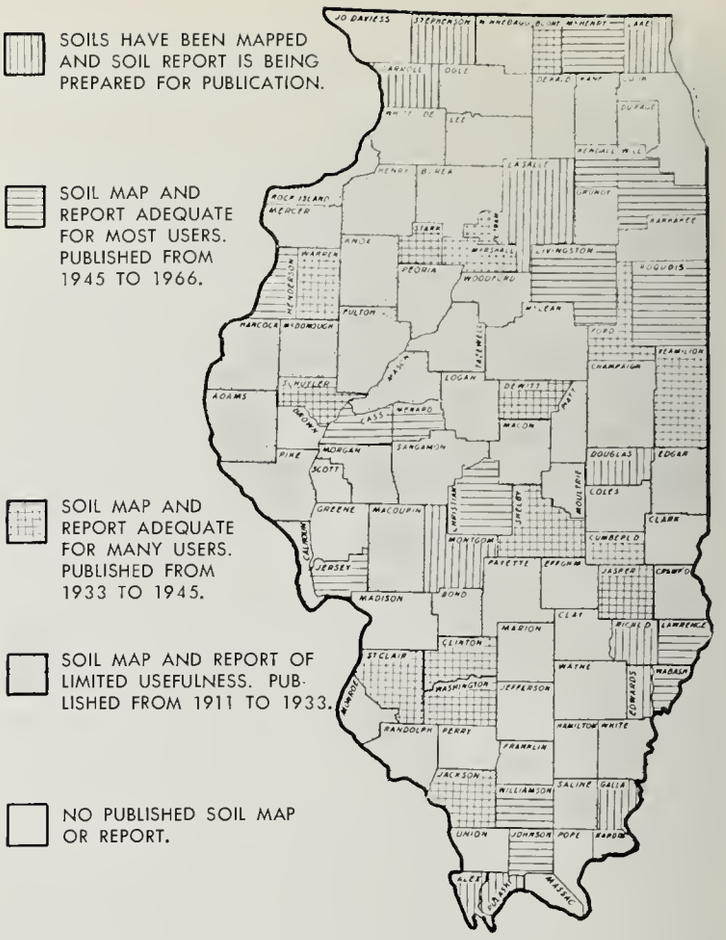
The 14 counties in the second group have soil maps and reports which are adequate for most users and were published from 1945 to 1966. The soils were mapped on aerial photographs at a scale of either 3¼ or 4 inches to a mile. The published maps are at a scale of either 1

inch, 1½ inches, or about 3¼ inches per mile. Slope and erosion, as well as soil type, are shown on the Henderson, Jersey, Johnson, Lawrence, Menard, Wabash, and Williamson county maps. Also included in this group are the soil maps and reports of Cass, Christian, Iroquois, Kendall, Livingston, McHenry, and Will counties in which slope and degree of erosion are not shown on the published map.

The third group includes 16 counties in which the soil map and soil report are adequate for many users, especially if supplemented by more recent information and interpretation. These maps and reports have modern soil type names and numbers and are published at scales of ½ or 1 inch per mile. They were published from 1933 to 1945. Slope and erosion are not included.

Most of the other counties are in a fourth group in which the maps and reports were published from 1911 to 1933 at a scale of ½ inch per mile. Old soil type numbers and descriptive names were used. These maps are of limited usefulness. When used, they should be interpreted by a qualified soil scientist with the aid of the general soil map included here, and individual county soil association maps which are available through the University of Illinois Agronomy Department. Soil maps of counties in northeastern Illinois which were made prior to 1930 do not show the character of the glacial till underlying the soils. Because the underlying glacial till often influences the characteristics and producing capacities of the soils in this region to great extent, it is necessary to interpret these older maps with the aid of more recent information. Illinois Bulletin 665 gives detailed properties of the glacial tills and some of the associated soils in this area. Counties having soil maps which do not indicate the nature of the underlying glacial till and consequent important soil variations in northeastern Illinois include Champaign, Du Page, Grundy, Kane, Kankakee, McLean, Piatt, and Woodford.

The last group includes 13 counties in which there are no published soil maps or reports. Some of these counties are being mapped at the present time and some information on soil conditions in these counties is available



Status of soil survey maps and reports in Illinois, 1966. (Fig. 16)

through the University of Illinois Agronomy Department and the Soil Conservation Service of the U.S. Department of Agriculture.

As mentioned previously, detailed information on Illinois soils is published in Illinois county soil reports which are listed on page 43. Soil reports are available through the county extension offices and the Agronomy Department, University of Illinois, Urbana, Illinois 61801. Recent soil reports published by the Soil Conservation Service of the U.S. Department of Agriculture, such as the one for Wabash County, are also available through the Soil Conservation Service district offices.

Illinois County Soil Reports[1]

Adams, 24
Bond, 8
Boone, 65
Bureau, 20[2]
Calhoun, 53
Cass, 71
Champaign, 18
Christian, 73
Clay, 1
Clinton, 57
Coles, 44
Cumberland, 69
DeKalb, 23 (map only)
DeWitt, 67
Douglas, 43
Du Page, 16
Edgar, 15
Edward, 46
Effingham, 48
Fayette, 52
Ford, 54
Fulton, 51
Grundy, 26
Hancock, 27
Hardin, 3
Henderson, 77
Henry, 41
Iroquois, 74[3]
Jackson, 55[2]
Jasper, 68
Jersey, 84[3]
Johnson, 82[3]
Kane, 17
Kankakee, 13 (also supplement)
Kendall, 75
Knox, 6
Lake, 9
La Salle, 5
Lawrence, 78
Lee, 37
Livingston, 72
Logan, 39
Macon, 45 (revised)
Macoupin, 50
Marion, 34
Marshall, 59
Mason, 28
McDonough, 7
McHenry, 81[3]
McLean, 10
Menard, 76
Mercer, 29
Morgan, 42
Moultrie, 2
Ogle, 38
Peoria, 19 (revised)
Piatt, 47
Pike, 11
Putnam, 60
Randolph, 32
Rock Island, 31
Saline, 33
Sangamon, 4
Schuyler, 56
Shelby, 66
St. Clair, 63
Stark, 64
Tazewell, 14
Vermilion, 62 (map only)
Wabash, 83[3]
Warren, 70
Washington, 58
Wayne, 49
Whiteside, 40
Will, 80[3]
Williamson, 79[3]
Winnebago, 12
Woodford, 36

Illinois unbound county soil maps

Crawford[1]
Franklin[1]
Monroe[1]
White[1]

Illinois County Soil Association maps and reports

Cook
Jo Daviess
Madison

Counties in which soil surveys have been completed recently and soil reports are being prepared for publication[4]

Alexander
Carroll[3]
Douglas
Edwards
Gallatin
Lake
La Salle
Montgomery
Pulaski
Richland
Stephenson

[1] The older soil maps and soil reports, especially those published before 1933 (Soil Reports No. 1 to 53 inclusive), should be interpreted and used in connection with new soil information as it becomes available.
[2] No longer available for distribution.
[3] Personalized soil management guides may be obtained from the farm adviser and Soil Conservation Service district office in Carroll, Iroquois, Jersey, Johnson, McHenry, Wabash, Will, and Williamson counties.
[4] Until the soil reports are available for distribution, information on individual tracts may be obtained by submitting a detailed legal description (township, range, section, and so on) of the area for which information is needed. Send this description to the Soil Survey Section, Agronomy Department, University of Illinois, Urbana, Illinois 61801.

Numerical Index to Illinois Soil Series and the Soil Association Areas in Which They Occur

Soil series No. and name	Soil association areas
2 Cisne	F
3 Hoyleton	F
4 Richview	F
5 Blair	Q
6 Fishhook	N
7 Atlas	N
8 Hickory	N,P,Q
12 Wynoose	Q
13 Bluford	Q
14 Ava	Q
15 Parke	P,Q
16 Rushville	N
17 Keomah	N
18 Clinton	N
19 Sylvan	L,O
21 Pecatonica	T
22 Westville	T
23 Blount	V
24 Dodge	U
25 Hennepin	T,U
26 Wagner	W
27 Miami	U
28 Jules	Z
29 Dubuque	Y
30 Hamburg	L,O
31 Levan	X
34 Tallula	A
35 Bold	L,O
36 Tama	A
37 Worthen	W
39 Oakford	W
40 Dodgeville	Y
41 Muscatine	A
42 Papineau	K
43 Ipava	A
44 Hartsburg	A
45 Denny	A
46 Herrick	D
47 Virden	A,D
48 Ebbert	E,F
49 Watseka	X
50 Virden	D
53 Bloomfield	X
54 Plainfield	X
55 Sidell	B
56 Dana	B
57 Montmorenci	U
59 Lisbon	I
60 LaRose	I
61 Atterberry	L
62 Herbert	U
67 Harpster	A,B,W
68 Sable	A
69 Milford	W
70 Beaucoup	Z
71 Darwin	Z
72 Sharon	Z
74 Radford	Z
75 Drury	W
76 Otter	Z
77 Huntsville	Z
78 Arenzville	Z
79 Volinia	G
80 Alexis	W
81 Littleton	W
82 Millington	Z
83 Wabash	Z
84 Okaw	W
85 Jacob	Z
87 Dickinson	X
88 Hagener	X
89 Maumee	X
90 Plainfield	X
91 Swygert	C,K
92 Sarpy	Z
93 Rodman	G,S
97 Houghton	J
98 Ade	X
100 Palms	J
101 Milroy	X
102 LaHogue	W
103 Houghton	J
104 Virgil	W
105 Batavia	W
107 Sawmill	Z
108 Bonnie	Z
109 Racoon	Q
110 Venedy	W
112 Cowden	E
113 Oconee	E
114 O'Fallon	E
116 Whitson	L,O
119 Elco	N
120 Huey	E,F
122 Colp	W
124 Beaucoup	Z
125 Selma	W
127 Harrison	D
128 Douglas	D
130 Pittwood	W,X
131 Alvin	X
132 Starks	W
134 Camden	W
136 Brooklyn	W
137 Ellison	W
138 Shiloh	D,E
141 Wesley	J
142 Patton	W
144 Alvin	X
145 Saybrook	I
146 Elliott	J
147 Clarence	K
148 Proctor	W
149 Brenton	W
150 Onarga	X
151 Ridgeville	X
152 Drummer	B,I,W
153 Pella	B,I
154 Flanagan	B
155 Stockland	G
156 Ridgeville	X
157 Rankin	J
159 Pilot	W
161 Newart	Z
162 Gorham	Z
164 Stoy	P
165 Weir	P
167 Lukin	F
171 Catlin	B
172 Hoopeston	X
173 McGary	W
175 Lamont	X
176 Marissa	W
178 Ruark	X
180 Dupo	Z
184 Roby	X
185 Roby	X
187 Milroy	X
188 Beardstown	W
189 Martinton	W
190 Onarga	X
191 Knight	H,W
192 Del Rey	W
194 Morley	V
197 Troxel	G,H,W
198 Elburn	W
199 Plano	W
200 Orio	X
201 Gilford	X
202 Biggs	X
203 Kilbourne	X
204 Ayr	I
205 Metea	U
206 Thorp	W
207 Ward	M
208 Sexton	W
210 Lena	J,V
211 Tamms	W
212 Thebes	W
214 Hosmer	P
215 Wartrace	P
216 Stookey	O
218 Newberry	F
219 Millbrook	W
220 Plattville	Y
221 Parr	I
223 Varna	J
224 Strawn	U
225 Beaver	T
227 Argyle	T
228 Eylar (Nappanee)	V
229 Monee	K
230 Rowe	K
232 Ashkum	J
233 Birkbeck	M
234 Sunbury	M
235 Bryce	C,K
236 Sabina	M
237 Hoopeston	X
238 Rantoul	K
239 Dorchester	Z
241 Chatsworth	V

Numerical Index to Illinois Soil Series and the Soil Association Areas in Which They Occur — concluded

Soil series No. and name	Soil association areas
242 Kendall	W
243 St. Charles	W
244 Hartsburg	A
246 Bolivia	A
248 McFain	Z
249 Edinburg	A
250 Velma	D,E
252 Harvel	D
253 Stonington	G,S
256 Pana	D
257 Clarksdale	N
258 Sicily	N
259 Assumption	D
261 Niota	W
262 Denrock	W
263 Fall	L
264 El Dara	N,Q
265 Lomax	W
266 Disco	X
268 Mt. Carroll	L
270 Oquawka	X
271 Timula	L,O
272 Edgington	A
273 Decorra	L
274 Seaton	L
275 Joy	A
276 Biggsville	A
277 Port Byron	A
278 Stronghurst	L
279 Rozetta	L
280 Fayette	L
281 Hopper	L
282 Chute	L
283 Clary	N
284 Tice	Z
285 Carmi	G
286 Carmi	G
287 Chauncey	F
288 Petrolia	Z
289 Omaha	G
290 Warsaw	G
291 Xenia	M
292 Wallkill	T
293 Andres	J
294 Symerton	J
295 Mokena	K
296 Washtenaw	T
297 Ringwood	H
298 Beecher	V
299 Nippersink	T
300 Abington	G
301 Grantsburg	R
302 Ambraw	Z
304 Landes	Z
305 Palestine	G
306 Allison	Z
307 Iona	L,O
308 Alford	O
309 Keytesville	Y
310 McHenry	T
311 Ritchey	Y
313 Rodman	G,S
314 Joliet	Y
315 Channahon	Y
316 Romeo	Y
317 Millsdale	Y
318 Lorenzo	G
320 Frankfort	V
321 DuPage	Z
322 Russell	M
323 Casco	S
324 Lena	V
325 Dresden	S
326 Homer	S
327 Fox	S
329 Will	G
330 Peotone	B,C,J
331 Haymond	Z
332 Billett	X
333 Wakeland	Z
334 Birds	Z
335 Robbs	R
337 Creal	Q
338 Hurst	W
339 Wellston	R
340 Zanesville	R
341 Gilmer	W
342 Matherton	S
343 Kane	G
344 Harvard	W
346 Dowagiac	W
348 Wingate	M
353 Toronto	M
359 Epworth	X
361 Lapeer	T
363 Griswold	H
364 Pistakee	S,T
375 Rutland	C
382 Belknap	Z
386 Downs	L
388 Wenona	C
389 Bullard	Y
390 Hesch	Y
397 Boone	Y
400 Calco	Z
410 Woodbine	Y
411 Ashdale	Y
412 Ogle	H
413 Gale	Y
414 Myrtle	T
415 Orion	Z
416 Durand	H
417 Derinda	Y
418 Schapville	Y
419 Flagg	T
420 Piopolis	Z
422 Cape	Z
425 Muskingum	R
426 Karnak	Z
427 Burnside	Z
429 Palsgrove	Y
435 Streator	C
448 Mona	K
451 Lawson	Z
452 Riley	Z
453 Muren	O
454 Iva	O
456 Ware	Z
460 Ginat	W
461 Weinbach	W
462 Sciotoville	W
463 Wheeling	W
465 Montgomery	W
467 Markland	W
469 Emma	W
470 Keller	A,N
471 Bodine	Y
474 Piasa	D,E
475 Elsah	Z
481 Raub	B
482 Uniontown	W
484 Harco	W
490 Odell	I
495 Corwin	I
496 Fincastle	M
497 Mellott	M
506 Hitt	Y
511 Dubuque	Y
531 Markham	V
546 Keltner	Y
547 Eleroy	Y
549 Marseilles	Y
551 Gosport	Y
560 St. Clair	V
562 Ideal	A
563 Fay	L
564 Ustick	A
565 Wysox	L
568 Perrot	W
572 Loran	Y
576 Zwingle	W
578 Dorchester	Z
581 Tamalco	E,F
583 Pike	P,Q
584 Walshville	E,F
585 Negley	P,Q
589 Bowdre	Z
590 Cairo	Z
594 Reddick	J
616 Celina	U
617 Otterbein	U
633 Traer	L
656 Octagon	U
660 Coatsburg	A,N
673 Ebner	X
723 Reesville	L,O,W
732 Argo	W

Alphabetical Index to Illinois Soil Series and the Soil Association Areas in Which They Occur

Soil series name and No.	Soil association areas
Abington 300	G
Ade 98	X
Alexis 80	W
Alford 308	O
Allison 306	Z
Alvin 131, 144	X
Ambraw 302	Z
Andres 293	J
Arenzville 78	Z
Argo 732	W
Argyle 227	T
Ashdale 411	Y
Ashkum 232	J
Assumption 259	D
Atlas 7	N
Atterberry 61	L
Ava 14	Q
Ayr 204	I
Batavia 105	W
Beardstown 188	W
Beaucoup 70, 124	Z
Beaver 225	T
Beecher 298	V
Belknap 382	Z
Biggs 202	X
Biggsville 276	A
Billett 332	X
Birds 334	Z
Birkbeck 233	M
Blair 5	Q
Bloomfield 53	X
Blount 23	V
Bluford 13	Q
Bodine 471	Y
Bold 35	L,O
Bolivia 246	A
Bonnie 108	Z
Boone 397	Y
Bowdre 589	Z
Brenton 149	W
Brooklyn 136	W
Bryce 235	C,K
Bullard 389	Y
Burnside 427	Z
Cairo 590	Z
Calco 400	Z
Camden 134	W
Cape 422	Z
Carmi 285, 286	G
Casco 323	S
Catlin 171	B
Celina 616	U
Channahon 315	Y
Chatsworth 241	V
Chauncey 287	F
Chute 282	L
Cisne 2	F
Clarence 147	K
Clarksdale 257	N
Clary 283	N
Clinton 18	N
Coatsburg 660	A,N
Colp 122	W
Corwin 495	I
Cowden 112	E
Creal 337	Q
Dana 56	B
Darwin 71	Z
Decorra 273	L
Del Rey 192	W
Denny 45	A
Denrock 262	W
Derinda 417	Y
Dickinson 87	X
Disco 266	X
Dodge 24	U
Dodgeville 40	Y
Dorchester 239, 578	Z
Douglas 128	D
Dowagiac 346	W
Downs 386	L
Dresden 325	S
Drummer 152	B,I,W
Drury 75	W
Dubuque 29, 511	Y
DuPage 321	Z
Dupo 180	Z
Durand 416	H
Ebbert 48	E,F
Ebner 673	X
Edgington 272	A
Edinburg 249	A
Elburn 198	W
Elco 119	N
El Dara 264	N,Q
Eleroy 547	Y
Elliott 146	J
Ellison 137	W
Elsah 475	Z
Emma 469	W
Epworth 359	X
Eylar (Nappanee) 228	V
Fall 263	L
Fay 563	L
Fayette 280	L
Fincastle 496	M
Fishhook 6	N
Flagg 419	T
Flanagan 154	B
Fox 327	S
Frankfort 320	V
Gale 413	Y
Gilford 201	X
Gilmer 341	W
Ginat 460	W
Gorham 162	Z
Gosport 551	Y
Grantsburg 301	R
Griswold 363	H
Hagener 88	X
Hamburg 30	L,O
Harco 484	W
Harpster 67	A,B,W
Harrison 127	D
Hartsburg 44, 244	A
Harvard 344	W
Harvel 252	D
Haymond 331	Z
Hennepin 25	T,U
Herbert 62	U
Herrick 46	D
Hesch 390	Y
Hickory 8	N,P,Q
Hitt 506	Y
Homer 326	S
Hoopeston 172, 237	X
Hopper 281	L
Hosmer 214	P
Houghton 97, 103	J
Hoyleton 3	F
Huey 120	E,F
Huntsville 77	Z
Hurst 338	W
Ideal 562	A
Iona 307	L,O
Ipava 43	A
Iva 454	O
Jacob 85	Z
Joliet 314	Y
Joy 275	A
Jules 28	Z
Kane 343	G
Karnak 426	Z
Keller 470	A,N
Keltner 546	Y
Kendall 242	W
Keomah 17	N
Keytesville 309	Y
Kilbourne 203	X
Knight 191	H,W
LaHogue 102	W
Lamont 175	X
Landes 304	Z
Lapeer 361	T
LaRose 60	I
Lawson 451	Z
Lena 210	J,V
Lena 324	V
Levan 31	X
Lisbon 59	I
Littleton 81	W
Lomax 265	W
Loran 572	Y
Lorenzo 318	G
Lukin 167	F
Marissa 176	W
Markham 531	V
Markland 467	W
Martinton 189	W

Alphabetical Index to Illinois Soil Series and the Soil Association Areas in Which They Occur — concluded

Soil series name and No.	Soil association areas
Marseilles 549	Y
Matherton 342	S
Maumee 89	X
McFain 248	Z
McGary 173	W
McHenry 310	T
Mellott 497	M
Metea 205	U
Miami 27	U
Milford 69	W
Millbrook 219	W
Millington 82	Z
Millsdale 317	Y
Milroy 101, 187	X
Mokena 295	K
Mona 448	K
Monee 229	K
Montgomery 465	W
Montmorenci 57	U
Morley 194	V
Mt. Carroll 268	L
Muren 453	O
Muscatine 41	A
Muskingum 425	R
Myrtle 414	T
Nappanee (Eylar) 228	V
Negley 585	P,Q
Newart 161	A
Newberry 218	F
Niota 261	W
Nippersink 299	T
Oakford 39	W
Oconee 113	E
Octagon 656	U
Odell 490	I
O'Fallon 114	E
Ogle 412	H
Okaw 84	W
Omaha 289	G
Onarga 150, 190	X
Oquawka 270	X
Orio 200	X
Orion 415	Z
Otter 76	Z
Otterbein 617	U
Palestine 305	G
Palms 100	J
Palsgrove 429	Y
Pana 256	D
Papineau 42	K
Parke 15	P,Q
Parr 221	I
Patton 142	W
Pecatonica 21	T
Pella 153	B,I
Peotone 330	B,C,J
Perrot 568	W
Petrolia 288	Z
Piasa 474	D,E
Pike 583	P,Q
Pilot 159	W
Piopolis 420	Z
Pistakee 364	S,T
Pittwood 130	W,X
Plainfield 54, 90	X
Plano 199	W
Plattville 220	Y
Port Byron 277	A
Proctor 148	W
Racoon 109	Q
Radford 74	Z
Rankin 157	J
Rantoul 238	K
Raub 481	B
Reddick 594	J
Reesville 723	L,O,W
Richview 4	F
Ridgeville 151, 156	X
Riley 452	Z
Ringwood 297	H
Ritchey 311	Y
Robbs 335	R
Roby 184, 185	X
Rodman 93, 313	G,S
Romeo 316	Y
Rowe 230	K
Rozetta 279	L
Ruark 178	X
Rushville 16	N
Russell 322	M
Rutland 375	C
Sabina 236	M
Sable 68	A
Sarpy 92	Z
Sawmill 107	Z
Saybrook 145	I
Schapville 418	Y
Sciotoville 462	W
Seaton 274	L
Selma 125	W
Sexton 208	W
Sharon 72	Z
Shiloh 138	D,E
Sicily 258	N
Sidell 55	B
St. Charles 243	W
St. Clair 560	V
Starks 132	W
Stockland 155	G
Stonington 253	G,S
Stookey 216	O
Stoy 164	P
Strawn 224	U
Streator 435	C
Stronghurst 278	L
Sunbury 234	M
Sylvan 19	L,O
Symerton 294	J
Swygert 91	C,K
Tallula 34	A
Tama 36	A
Tamalco 581	E,F
Tamms 211	W
Thebes 212	W
Thorp 206	W
Tice 284	Z
Timula 271	L,O
Toronto 353	M
Traer 633	L
Troxel 197	G,H,W
Uniontown 482	W
Ustick 564	A
Varna 223	J
Velma 250	D,E
Venedy 110	W
Virden 47, 50	A,D
Virgil 104	W
Volinia 79	G
Wabash 83	Z
Wagner 26	W
Wakeland 333	Z
Wallkill 292	T
Walshville 584	E,F
Ward 207	M
Ware 456	Z
Warsaw 290	G
Wartrace 215	P
Washtenaw 296	T
Watseka 49	X
Weinbach 461	W
Weir 165	P
Wellston 339	R
Wenona 388	C
Wesley 141	J
Westville 22	T
Wheeling 463	W
Whitson 116	L,O
Will 329	G
Wingate 348	M
Woodbine 410	Y
Worthen 37	W
Wynoose 12	Q
Wysox 565	L
Xenia 291	M
Zanesville 340	R
Zwingle 576	W

15M—8-67—93018
5M—7-71—18435

GENERAL SOIL MAP OF ILLINOIS

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Agricultural Experiment Station, College of Agriculture
University of Illinois at Urbana-Champaign
In cooperation with the Soil Conservation Service, U.S. Department of Agriculture

268	Mt. Carroll	Fine-silty, mixed, mesic Mollic Hapludalfs	3
442	Mundelein	Fine-silty, mixed, mesic Aquic Argiudolls	85
453	Muren	Fine-silty, mixed, mesic Aquic Hapludalfs	17, 228, 243
41	Muscatine	Fine-silty, mixed, mesic Aquic Hapludolls (Most Muscatine in Illinois is in Aquic Argiudolls.)	8
621	Muskego	Coprogenous, euic, mesic Limnic Medisaprists	308
425	Muskingum	Fine-loamy, mixed, mesic Typic Dystrochrepts	235
414	Myrtle	Fine-silty, mixed, mesic Mollic Hapludalfs	59
649	Nachusa	Fine-loamy, mixed, mesic Aquic Argiudolls	42
592	Nameoki	Fine, montmorillonitic, mesic Fluvaquentic Hapludolls	289
228	Nappanee	Fine, illitic, mesic Aeric Ochraqualfs	120, 126
731	Nasset	Fine-silty, mixed, mesic Mollic Hapludalfs	213
585	Negley	Fine-loamy, mixed, mesic Typic Paleudalfs	48
976,977	Neotoma	Loamy-skeletal, mixed, mesic Ultic Hapludalfs	231
218	Newberry	Fine-silty, mixed, mesic Mollic Ochraqualfs	32
928	New Glarus	Fine-silty over clayey, mixed, mesic Typic Hapludalfs	209
261	Niota	Fine, mixed, mesic Mollic Albaqualfs	139
568	Niota, thin A	Fine, mixed, mesic Mollic Albaqualfs	140
741	Oakville	Mixed, mesic Typic Udipsamments	183
387	Ockley	Fine-loamy, mixed, mesic Typic Hapludalfs	168
113	Oconee	Fine, montmorillonitic, mesic Udollic Ochraqualfs	27
656	Octagon	Fine-loamy, mixed, mesic Mollic Hapludalfs	101
490	Odell	Fine-loamy, mixed, mesic Aquic Argiudolls	100
412	Ogle	Fine-silty, mixed, mesic Typic Argiudolls	57
574	Ogle, silt loam substratum	Fine-silty, mixed, mesic Typic Argiudolls	58
84	Okaw	Fine, montmorillonitic, mesic Typic Albaqualfs	143
289	Omaha	Coarse-loamy, mixed, mesic Aquic Hapludolls	153
150	Onarga	Coarse-loamy, mixed, mesic Typic Argiudolls	191
673	Onarga, red subsoil	Coarse-loamy, mixed, mesic Typic Argiudolls	192
752	Oneco	Fine-loamy, mixed, mesic Mollic Hapludalfs	206
200	Orio	Fine-loamy, mixed, mesic Mollic Ochraqualfs	174
415	Orion	Coarse-silty, mixed, nonacid, mesic Aquic Udifluvents	274
76	Otter	Fine-silty, mixed, mesic Cumulic Haplaquolls	282
100	Palms	Loamy, mixed, euic, mesic Terric Medisaprists	306
429	Palsgrove	Fine-silty, mixed, mesic Typic Hapludalfs	214
256	Pana	Fine-loamy, mixed, mesic Typic Argiudolls	47
42	Papineau	Fine-loamy over clayey, mixed, mesic Aquic Argiudolls	128
15	Parke	Fine-silty, mixed, mesic Ultic Hapludalfs	49
619	Parkville	Clayey over loamy, montmorillonitic, mesic Fluvaquentic Hapludolls	291
221	Parr	Fine-loamy, mixed, mesic Typic Argiudolls	100
142	Patton	Fine-silty, mixed, mesic Typic Haplaquolls	131
21	Pecatonica	Fine-loamy, mixed, mesic Typic Hapludalfs	56
153	Pella	Fine-silty, mixed, mesic Typic Haplaquolls	85, 100
330	Peotone	Fine, montmorillonitic, mesic Cumulic Haplaquolls	115
288	Petrolia	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents	277
474	Piasa	Fine, montmorillonitic, mesic Mollic Natraqualfs	35
583	Pike	Fine-silty, mixed, mesic Ultic Hapludalfs	51
159	Pillot	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls	65